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LECTURES ON

CLINICAL MEDICINE,

DELIVERED AT THE HÔTEL-DIEU, PARIS.

BY

A. TROUSSEAU,

Late Professor of Clinical Medicine in the Faculty of Medicine, Paris; Physician to the Hotel-Dieu; Member of the Imperial Academy of Medicine; Commander of the Legion of Honor; Grand Officer of the Order of the Lion and the Sun of Persia; Ex-representative of the People in the National Assembly; &c. &c. &c.

TRANSLATED FROM THE EDITION OF 1868,

Being the Third Revised and Enlarged Edition;

BY

JOHN ROSE CORMACK, M.D. EDIN., F.R.S.E.,

Fellow of the Royal College of Physicians of Edinburgh; formerly Lecturer on Forensic Medicine in the Medical School of Edinburgh, and formerly Physician to the Royal Infirmary and Fever Hospitals of Edinburgh; Corresponding Member of the Academy of Surgery of Madrid, &c. &c.

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Trousseau's Lectures on Clinical Medicine, so favorably received as well by the profession of the United States as abroad, are published by the subscribers with the approbation of the New Sydenham Society, under whose auspices the translation is now made. Parts 1, 2, and 3, or Volume One of the work, can be furnished to parties requiring them to complete their sets.

Lindsay & Blakiston.

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The first volume of the Translation of Trousseau's 'Clinical Medicine' as published by the late Dr. Bazire, and issued last year to the members of the New Sydenham Society, consisted of Selected Lectures. Dr. Bazire did not follow the author's order of sequence. In continuing the translation of the work the Council has had two courses open to it, either to revert as far as possible to the original arrangement, or to continue the attempt at a fresh classification. The first of these has, for obvious reasons, been decided upon. The only inconvenience which will result to the reader will be that the numbers of the Lectures in the translation will not correspond in all cases with their numbers in the original. Dr. Bazire's volume (Vol. I) contained Lectures numbered by him I to XXIII, but which in the original were otherwise numbered and otherwise arranged. To prevent confusion, and obviate difficulties or mistakes in referring to or quoting the translation, a statement is subjoined to show the numbers of the Lectures respectively represented by Dr. Bazire's numeration and by the numeration of the French edition of 1868—the latest and best edition—from which the Council has continued the translation for the New Sydenham Society.

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I.	XXXIX.	XIII.	XLV.
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XII.	XLIV.		

The present volume contains a translation of the first twenty-one Lectures.

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CONTENTS.

PAGE.

ADVERTISEMENT. . . . . 1—2

INTRODUCTION:—WHAT IS CLINICAL MEDICINE? . . 3—45

LECTURE I.

SMALL-POX.

DISTINCT SMALL-POX.—Constipation.—Convulsions.—Rachialgia.—Paraplegia of Small-Pox.—Duration of the Period of Invasion.—Eruption with Reference to its Position on Face, Trunk and Limbs.—Orchitis of Small-Pox.—Desiccation. . . . . 47—62.

CONFLUENT SMALL-POX.—Diarrhœa Chiefly in Children at the Commencement of the Illness.—Salivation.—Swelling of the Face.—Swelling of the Hands, and Nervous Complications.—Boils.—Abscesses.—Purulent Infection.—Albuminuria.—Anasarca.—Treatment. . . . 62—88.

LECTURE II.

VARIOLOUS INOCULATION.

Advantages of Inoculation.—Experiments on Clavelisation.—Dangers of Inoculation and Means of diminishing them.—Methods of Inoculating.—The Mother-Pock and its Satellites.—General Symptoms. . 89—98.

LECTURE III.

COW-POX.

Grease of Horses.—Cow-pox in the Cow.—Cow-pox in the Human Subject.—Cow-pox and Horse-pox are Analogous to, but Not Identical with Small-pox.—Practical Importance of this Distinction.—Regeneration of Cow-pox. . . . . 98—121.

Transmission of Cow-pox from Man to Man.—Circumstances Favourable to Successful Vaccination.—The Lymph ought to be taken between the Fifth and Seventh Days.—Selection of Subjects from whom the Lymph ought to be taken.—Health of Persons who are to be Vaccinated.—Transmission of Syphilis in Vaccination.—Vaccinal Eruptions.—Modified Cow-pox.—Regeneration of Lymph.—Revaccination.—Vaccination at the Bar of Public Opinion. . . . . 121—154.

LECTURE IV.

CHICKEN-POX.

Chicken pox or Varicella essentially different from Modified Small-pox.—Unlike Small-pox, it does not protect from Variolous Contagion.—Small-pox does not protect from Chicken-pox.—Course and Characteristics of the Eruption. . . . . 155—160.

LECTURE V.

SCARLATINA.

Variety in the Characters of Epidemics.—Contagion.—Incubation.—Complications at the Beginning of an Attack.—Characters of the Eruption.—Desquamation. . . . . 161—175.

Cerebral and Nervous Complications.—Sore Throat complicated with Diphtheria.—Buboes.—Rheumatism. . . . 175—183.

Complications occurring during the Decline of the Disease.—Anasarca.—Hæmaturia.—Albuminuria.—Convulsions.—Œdema of the Glottis.—Pleurisy.—Pericarditis.—Endocarditis.—Rheumatism.—Scarlatina without Eruption.—Anasarca without Eruption.—Treatment. . . 183—211.

LECTURE VI.

MEASLES AND IN PARTICULAR ITS UNFAVOURABLE SYMPTOMS AND COMPLICATIONS.

Normal Measles.—Period of Invasion is longer than in any other Eruptive Fever.—Complications of the Period of Invasion.—Convulsions at the Beginning of the Attack.—False Croup.—Suffocative Catarrh.—Epistaxis.—Otitis.—Diarrhœa.—Complications of the Eruptive Stage, and of the Last Stage. . . . . 212—235.

LECTURE VII.

RUBEOLA.

Very Different Disease from Measles.—Stands in the same Relation to Measles as Chicken-pox to Small-pox.—Does not produce Catarrh of the Mucous Membrane.—No Serious Sequelæ.—May attack the same person more than once, and does not confer Exemption from Measles. 236—238.

LECTURE VIII.

ERYTHEMA NODOSUM.

A Specific and Separate Disease.—Successive Eruptions.—Articular Pains.—General Symptoms.—A Possible Manifestation of the Rheumatic Diathesis. . . . . 239—243.

LECTURE IX.

ERYTHEMA PAPULATUM.

Differs from Erythema Nodosum in the Form and Seat of the Eruption, and in the Severity of the Symptoms.—Rheumatic Character. . 244—250.

LECTURE X.

ERYSIPELAS AND IN PARTICULAR ERYSIPELAS OF THE FACE.

Pathology of Erysipelas.—Almost always an exciting Cause independent of Individual Predisposition and General Cause.—May Supervene in the Course of Epidemics.—Severity increased by Traumatic Influence.—General Symptoms dependent on Inflammation of Wound and Lymphatic Vessels.—Delirium has not the Signification attributed to it in Erysipelas.—Erysipelas sometimes Contagious.—When not a Complication of Another Disease is a Mild Affection which subsides spontaneously.—Treatment ought to be Expectant. . . . . 251—265.

ERYSIPELAS OF NEW-BORN INFANTS.

Affection often Puerperal.—Differs Essentially from Ordinary Erysipelas.—Generally Fatal. . . . . 266—274.

LECTURE XI.

MUMPS.

A Specific and Contagious Disease.—Metastases.—Complications. 275—281.

LECTURE XII.

URTICARIA.

A Distinct Nosological Species.—Sudoral Nettlerash [*l'éruption ortiée sudorale*] is no more Urticaria than Morbilliform and Scarlatiniform Sudoral Eruptions are Measles and Scarlatina.—General Precursory Symptoms.—Exciting Causes. . . . . 282—287.

LECTURE XIII.

ZONA OR HERPES ZOSTER.

Characteristics.—Accompanying Pains.—Inveterate Consecutive Neuralgic Affections. . . . . 288—296.

LECTURE XIV.

SUDORAL EXANTHEMATA.

Multiplicity of Forms.—Cutaneous and Mucous Exanthemata.—Physiological Causes.—Antagonism of the Secretions of the Skin and the Secretions of the Intestinal, Respiratory and Urinary Mucous Membranes.—Exanthemata produced by Medicinal Agents.—Sudoral Exanthemata becoming Purulent in Lying-in Women and Others.—Analogies between Sudoral Exanthemata and Exanthemata produced by a Virus or Dependent on Diathesis. . . . . 297—311.

LECTURE XV.

DOTHINENTERIA, OR TYPHOID FEVER.

Specific Lesion.—Furuncular Eruption of the Intestine.—Intestinal Perforation.—Peritonitis without Perforation. . . . 312—325.
Intestinal Hæmorrhage.—Hæmorrhagic Putrid Fever. . 325—334.
Granular and Waxy Degeneration of the Striated Muscles in Typhoid Fever.—Nature and Consequences of this Degeneration.—Special Course of the Rise and Fall of Temperature in Typhoid Fever: This is Characteristic.—Parallelism between the Course of Temperature and the Evolution of the Intestinal Lesions. . . . . 334—343.
Rosy Lenticular Spots.—Successive Eruptions.—Miliary Eruption.—Blue Spots. . . . . 344—348.
Intestinal Dothinenteric Catarrh.—Its Specific Character.—Predominance of Intestinal and Pulmonary Catarrhal Affections constitutes the Forms of the Disease called "Abdominal" and "Thoracic." . 348—352.
Forms of Dothinenteria, viz. the Mucous, Bilious, Inflammatory, Adynamic, Ataxic, Spinal, Cerebro-Spinal, and Malignant. . . 352—363.
Parotitis and Deafness as Prognostic Signs of Dothinenteria. . 363—364.
Dothinenteria may at first simulate Intermittent Fever; and Marsh [Intermittent] Fever may likewise at the beginning of the attack simulate Dothinenteria. . . . . 364—370.
Contagion.—Conditions under which Dothinenteria occurs. . 370—376.
Treatment of Dothinenteria.—Regimen of the Patients. . 376—385.
Affections which occur during Convalescence.—Gastric Disturbance.—Vomiting.—Diarrhœa.—Nervous Symptoms.—Vertigo.—Delirium.—Impaired Mental Power.—Paralysis.—Dropsical Effusions. . 385—393.

Local Complications which Supervene during, and at the Decline of Dothinenteria.—Softening of the Cornea, Affections of the Larynx, Necrosis of the Cartilages of the Nose.—Œdema of the Glottis supervening during Dothinenteria, and necessitating Tracheotomy.—Sloughs.—Erysipelas.—Colliquative Suppurations.—Paraplegia consecutive to Infiltration of Pus into the Spinal Canal producing Inflammation and Suppuration of the Spinal Marrow.—Spontaneous Gangrene of the Limbs. 394—419.

LECTURE XVI.

TYPHUS.

An Infectious Disease like Dothinenteria.—Differs from Dothinenteria in the Absence of Intestinal Lesions.—The two Fevers are distinguished from each other by the Aggregate of the Symptoms, and their Thermal Variations. . . . . 420—435.

LECTURE XVII.

MEMBRANOUS SORE THROAT, AND IN PARTICULAR HERPES OF THE PHARYNX. [*Common Membranous Sore Throat.*]

Many Different Kinds of Membranous Sore Throat.—Common Membranous Sore Throat often originates in Herpes of the Pharynx.—Often Difficult, especially during an epidemic, to form a good Differential Diagnosis between it and Diphtheritic Sore Throat.—In these Doubtful Cases we must act as if the malady were of a bad character.—Recovery from Common Membranous Sore Throat is Spontaneous. . 436—447.

LECTURE XVIII.

GANGRENOUS SORE THROAT.

Gangrenous Sore Throat from Excess of Inflammation.—Gangrenous Sore Throat Supervening as a Complication of severe diseases such as Dysentery, Typhoid Fever, &c.—Gangrenous Sore Throat as a Complication of Scarlatinous and Diphtheritic Sore Throat.—Primary Gangrenous Sore Throat. 448—459.

LECTURE XIX.

INFLAMMATORY SORE THROAT.

Recovery is Spontaneous.—Distinct from Rheumatic Sore Throat.—Distinct also from the Sore Throat caused by the Secretion from the Tonsils. 460—467.

LECTURE XX.

DIPHTHERIA.

Diphtheritic Sore Throat and Croup. [Pharyngeal and Laryngeal Diphtheria.]—Occurs in all Climates and all Seasons.—Chiefly attacks Children.—Manner in which it is propagated.—Glandular Swellings.—The Colour of the False Membranes: their Smell simulating that of Gangrene.—Its Propagation to the Larynx.—Croup.—Intermittance of Symptoms.—Generally proves Fatal when its Progress is not Stopped. 468—493.

Malignant Diphtheria.—A much more Terrible Form of the Disease.—The Local Affection is nothing compared to the Constitutional Symptoms.—It Kills, not like Croup by Asphyxiating the Patients by Suffocative Paroxysms, but it Kills by General Poisoning after the manner of Septic Diseases.—Glandular Engorgement considerable.—Erysipelatous Redness.—Membranous Coryza and Nasal Diphtheria.—Diphtheritic Ophthalmia.—Epistaxis.—Hæmorrhages of every kind.—Anæmia. 493—507.

Diversity of Localisation in Diphtheria.—Palpebral Diphtheria.—Cutaneous, Vulvar, Vaginal, Anal, and Preputial Diphtheria. 507—524.

Diphtheria of the Mouth.—Of all the Manifestations of Diphtheria, it has the greatest Tendency to remain confined to its own Locality.—May be Propagated to the Pharynx and Larynx, and produce Croup.—May lead to Gangrene.—May be a Manifestation of Malignant Diphtheria.—Exceedingly Contagious.—Epidemic. . . . 524—529.

Nature of Diphtheria: Contagion: Alteration of the Blood:—Albuminuria. . . . . 530—538.

Paralysis in Diphtheria.—Not a new Disease.—The Mild Form.—Symptoms.—Paralysis of the Veil of the Palate, of the Senses, Limbs, and of the Muscles of Organic Life.—Death by Suffocation, by Strangling.—The Aggravated Form.—Ataxo-adynamic Symptoms.—The Gravity of the Paralysis bears neither any Relation to the Intensity or Duration of the Pseudo-membranous Affection, nor to the Albuminuria. This kind of Paralysis is the Result of Poisoning.—Treatment. . 539—568.

Treatment of Diphtheria and Croup.—The Antiphlogistic Treatment ought to be absolutely rejected.—Alterative Treatment: Mercurials useful as Topical Agents: their inconveniences: alcalies, particularly Bicarbonate of Soda, of very doubtful benefit.—Chlorate of Potash useful in cases of average severity.—Emetic Treatment: its inconveniences greater than its advantages.—Serious Consequences produced by Blisters.—Topical Method of Treatment by Astringents and Causties is best treatment of Diphtheritic Affections.—Catheterism of the Larynx.—Indispensable Necessity of sustaining the Vital Powers of the Patients by Food and Tonic Medicines. . . . . 569—593.

Tracheotomy.—Its Utility and Necessity.—Mode of Operating.—The Dilator.—Operation ought to be very Slowly Performed: Dangers of rapid perform-

ance.—Dressing.—Cauterization of the Wound.—The Neckcloth.—General Treatment.—The chances of Success are the greater, the less energetic the anterior treatment has been.—Alimentation of the Patients.—Removal of the Canula.—Infected Canulæ.—A Condition Favourable to Success is to Operate as soon as possible.—Unfavourable Conditions.—Death is certain in Malignant Diphtheria: Death is almost certain in Children under two years. . . . . 594—617.

LECTURE XXI.

THRUSH.

Synonyms.—Micrographers regard it as Mycelium.—Arises from Modification of the Secretions produced by Inflammation of the Mouth.—In Adults is met with in advanced stage of nearly all Chronic Diseases.—Accompanying Intestinal Derangement.—In Children, supervenes also in Diseases, which, regard being had to the Age of the Subject may be considered Chronic.—Indicates, irrespective of the cause, a general state of Inanition.—When purely local is not a serious affection.—Mixed Thrush.—The Mouldy Eruption of Thrush may become developed on any mucous membrane covered with Epithelium, and having the Secretion altered.—The Different Erythematous Affections which accompany it depend upon a general state of the System.—Treatment: The local lesion is easily destroyed.—Necessary to continue the Use of Topical Agents for some days after the disappearance of Thrush, to modify the inflamed state of the Mucous Membrane.—The same treatment is applicable to the Cutaneous Lesions.—When Thrush depends on a General Condition of the System, the Treatment must be directed to the removal of the Causes of that Condition. . 618—630.

ADVERTISEMENT.

In this third edition, the work has undergone important modifications. For the accomplishment of this editorial labour, M. Trousseau selected his former *chef de clinique*, M. Michel Peter, now Professor *Agrégé* of the Faculty of Medicine, and Physician to the Hospitals of Paris. The first and second volumes were revised and corrected in accordance with the suggestions, and under the control of M. Trousseau. M. Peter modified the third volume in conformity with the suggestions of his master, who had ceased to live when that volume was being prepared; he had, however, left instructions regarding it, which were scrupulously followed. As the interpreter of his venerated master, M. Peter has striven to be equal to his task, and to represent faithfully the latest sayings of that profound and eloquent man whose voice is now for ever silenced.

Among the most extensive additions may be mentioned, researches regarding temperature in diseases, particularly in eruptive fevers and dothienteritis; granular and waxy degeneration of muscles; leucocytosis in typhoid fever; the spinal and cerebro-spinal type of typhoid fever; the application of the sphygmograph in diseases of the heart and in epilepsy; the laryngoscope in lesions of the lungs; and the ophthalmoscope in cerebral affections.

Besides additions, of which only the most important have been mentioned, a great number of lectures have been re-touched, and some have even been re-written. For example, the lecture on aphonia and cauterization of the larynx has been entirely re-cast, in consequence of the new views derived from the use of the laryngoscope; the lecture on hydrophobia has been re-cast: also that on alcoholism, in which have been incorporated the careful researches

with which contemporary science has enriched this subject. Next to the lectures now enumerated may be specified as having been most largely modified, those on pelvic hematocele, puerperal purulent infection, and phlegmasia alba dolens. Cases have been added whenever they imparted greater perspicuity, or contributed new views.

In the advertisement to the second edition, M. Trousseau recorded that MM. Leon Blondeau, Dumontpallier, and Peter, had "all three done more than merely edit his work; they had assisted him in his researches, and had often yielded to him the honour of very interesting inquiries, thereby making to a certain extent, a sacrifice on his account." It would have been unjust not to have here reproduced this grateful testimony of a deceased master.

Paris; *4th November*, 1867.

INTRODUCTION.

Gentlemen,—Before speaking to you about the patients in the wards, I require to tell you what I mean by "clinical instruction," both in respect of the teacher and the taught. To me it is no doubt pleasant to see numerous pupils crowding round the beds, and filling the benches of the theatre, but it is very much more pleasant to have the consciousness of discharging a useful mission, and of leaving on the youthful mind impressions which will by-and-bye yield fruit. Professor and pupils must conform to certain conditions, without attention to which clinical instruction will necessarily be sterile.

Although the clinic is the copestone of medical study, I would not wish you to suppose that it ought to be deferred till you have nearly reached the close of your curriculum as students. From the day on which a young man wishes to be a physician, he ought to attend the hospitals. It is essential to see—to be always seeing—sick persons. The heterogeneous materials, though amassed without order or method, are nevertheless excellent materials; they are for the present useless, but you will, at a later date, find them stored in the treasure-house of your memories. I am now an old man, yet I remember the patients whom I saw forty years ago, when on the threshold of my career. I recollect their principal symptoms, their anatomical lesions, and the numbers of their beds; and sometimes the names even of the patients come into my mind, after that long interval of time. These recollections are of service to me; they still afford me instruction, and you sometimes hear me appeal to them at our clinical meetings.

For these reasons, then, I ask the young student to attend every day an hospital visit. I care little whether he commence with medicine or surgery. Still, it appears to me more profitable at first to frequent the medical than the surgical wards. The young man is attracted by the display of surgical operations; the pomp of pre-

paration, the dexterity of the surgeon, the immediate conquests which he achieves, combine to strike and bewitch the youthful imagination; but, so far as instruction is concerned, the performance which he has witnessed is barren. Before one can understand the mechanism of the reduction of a fracture or dislocation, a considerable knowledge of anatomy and physiology must be acquired; but the pupil who is present at those delicate operations, in which the performer does not make the slightest cut without bearing in mind the minutest anatomical details, cannot understand the amount of skill, coolness, and intelligence required to attain results, which, to the operator are immense, but which are inappreciable by one who has everything to learn. I have always observed that young men were more delighted by those operations which demand no more intelligence than is required by a butcher's lad to cut up an ox, than by those wonderful proceedings, those delicate and thoughtful manipulations, the ability to perform which constitute the real surgeon, and which strike with admiration the thoroughly informed who can understand and appreciate them. You will not, then, derive real benefit from frequenting the surgical wards till you have been initiated in anatomy, while, for studying the rudiments of medicine, it will suffice to have acquired some superficial acquaintance with physiology.

You will soon become accustomed to see patients, to read in their countenances the gravity of their diseases, to feel the pulse and appreciate its character, and you will learn the first elements of auscultation and percussion. You will soon become acquainted with the chief functional disorders, and be able to recognise the modifications of the secretions and the excretions. You will see in the dead-house some of the relations between the lesions found on dissection, and the symptoms or signs observed during life. At the end of some months you will have learned many things which, if not then acquired, you would be obliged to learn at a subsequent stage of your studies. Let me repeat that these ideas will, in truth, be only confused; but still you will find as you go on that the lessons, and particularly the familiar conversations of your masters and fellow-students, will have helped you to arrange some of the disorderly materials; in any case, you will have learned enough to render attractive your future studies.

The public think it strange to hear physicians speak of the fascination which accompanies the study of our art. Literature, painting,

and music, do not yield an enjoyment more keen than that which is afforded by the study of medicine, and whoever does not find in it, from the commencement of his career, an almost irresistible attraction, ought to renounce the intention of following our profession.

But the very attractiveness of medicine when studied at the bedside, has, nevertheless, sometimes slight drawbacks. The young student who passes an hour or two every morning in the wards of an hospital, experiences no great pleasure in resuming his place at the dissection-table. I admit that, for the novice, the study of anatomy is often irksome. It is a study which forms an essential part of the education of the physician and surgeon; but its utility is not at once perceived, and the toilsome, disgusting nature of the occupation, combined with the sustained attention which is necessary, fatigue the student; in fact, it is only the inflexible requirements of the examiners which prevents the majority of our young recruits from deserting the dissecting-room; the facility and the charm, then, of hospital study may become a danger, by leading students to neglect necessary and laborious branches of their education.

The short time which you can devote to medicine, makes it very difficult for you to study the accessory sciences. It is important, therefore, that before entering upon the medical curriculum, you should possess a knowledge of chemistry and physics sufficient to enable you to understand their applications to medicine; but I would deeply deplore your losing time in acquiring too extensive a knowledge of chemistry. Although chemistry renders very restricted services to medicine properly so called, although in general the most eminent chemists have been poor physicians, and sterling practitioners have always been sorry chemists, I would not the less admit the desirability of the physician having a very extensive knowledge of chemistry, were it only for the purpose of convincing him of the vanity of the pretensions of the chemists, who believe that they can explain the laws of life and of therapeutics, because, forsooth, they know the nature of some of the re-actions which take place in the living body. As the life-time of an intelligent man is hardly long enough to enable him to make himself acquainted with medico-chirurgical pathology and therapeutics, why should the student be asked to distract his attention with accessory studies, which, without being wholly useless, are nevertheless too unimportant to be pursued at the

sacrifice of physiology, clinical instruction, and therapeutics, the subjects without a knowledge of which no man can be a physician?

Gentlemen, far from me be the thought of instituting a suit against the accessory sciences, and against chemistry in particular. I only condemn an exaggeration of their importance, their pretentiousness, their being mixed up with our art in an inappropriate and impertinent manner. I do not know any one who denies that all the compositions and decompositions, all the molecular movements, all the manifestations of force belonging to vegetative life are physico-chemical; but if among these manifestations there be some which are governed by laws similar to the laws which govern dead matter, there are others (and they are the most numerous, the most important, the most essential to living matter), which obey quite different laws—laws which perhaps chemistry may some day discover, but which for the present remain autonomous, special, unexplained, inexplicable, and when confronted by which, the vanquished chemists and natural philosophers ought to pause. I have no objection to their holding the opinion that, in a future, more or less remote, they may be able to subordinate vital to chemical laws, but in the mean time, I wish them to be modest, and not to pass off their hopes for ascertained truths. I am quite willing to confess my ignorance as a chemist, but only on condition that chemists admit their ignorance as physiologists and physicians.

I should be sorry to have to repeat to you discussions which, leaving every one in possession of his own opinions, have hitherto led to no result. I agree with the majority of physiologists and physicians in believing that the acts of organic life, and *à fortiori*, those of animal life are subject to laws which, in the mean time, ought to be regarded as essentially different from those which govern inorganic matter. Take two eggs, laid by the same hen with an interval of some days between them, the one having received, and the other not having received, the fecundating influence of the male. I beg the ablest chemist to tell me what analysis will tell him about the difference between these two eggs. In both there is albumen, fat, earthy phosphates, chlorides, and a little iron. Has the chemist discovered wherein consists the chemical and physical difference between these two eggs? Will he admit with me, and with everybody else, that their composition is identical? There is, however, a very small difference, quite insignificant, the chemist tells us: they say that one is organic matter without vitality, while the other

is absolutely identical organic matter, endowed with a property which, for want of a better name, we call *life*. Let us, nevertheless see how each egg is affected by the same influences. We place them below a hen, under exactly the same conditions as to light, temperature, and moisture. In a few days, the non-fecundated egg, obeying the laws of dead organic matter, will be putrescent, while the other will contain a contractile tube filled with blood: in a few days later, this minute vessel will consist of four compartments separated by valves, and will become a heart receiving and sending forth blood through separate channels. The calcareous phosphates will take their appointed places, lengthening out as jointed levers, moulded as cavities, or extended as plates. The albumen will be distributed in the blood, muscles, parenchyma, and membranes: the iron and the salts will take their own special and predetermined places.

"The retort has its mysteries," say chemists, but it appears to me that the fecundated egg has other and somewhat stranger mysteries. The talisman which exists in it, but not in the chemist's retort, is *life;* the singular properties of living matter are vital properties, and say what you will in opposition to them, you will be obliged to admit their existence.

If you kill the living matter, before incubation, by a violent shake, by elevating or lowering the temperature a little too much, or by the electric spark, and treat the non-fecundated egg in the same manner, the condition of both will become identical from that time, and the course which each will follow will thenceforth be similar. There will, however, be nothing less than there was before, except that trifle, which it is not worth while to take account of, *life*, or—if you like the term better—*vital properties*.

But the evolution-power of the embryo, in which the vital force appears so marvellous, continues to exist, perhaps, in a more simple but in a not less evident form. When the animal is fully formed, it is no longer from an amorphous material that the tissues select their constituent elements, but from a liquid of determinate composition—from the blood. Henceforth, it is this liquid which provides for all the aggregations, all the decompositions, and for that incessant movement constituting, in point of fact, one continuous evolution, which is, to the observer, less extraordinary than the first evolution, only because it is accomplished by completely formed instruments.

Is it possible that there exists one man so insane as to deny that

all the movements of composition and decomposition are something more than mere chemical manifestations. Combinations may be ternary or quaternary, but they are not the less only chemical combinations; and I do not know that any one has ever denied this statement. From this point of view we are all iatro-chemists, with this distinction, that the worshippers of chemistry hold that the changes in living plants and animals take place in accordance with the laws of inorganic chemistry, while we maintain that the laws which preside over organic chemical action are of a special character, and in particular, that in living organisms chemistry is controlled by special powers, which give it a special direction, placing it under conditions wholly different from those observed in matter destitute of life.

That which strikes me as most remarkable in the fecundated egg, as well as in the fully-formed animal, is not so much the complex chemical combinations which take place at so small a cost of effort as the elective affinities which manifest themselves, if I may be permitted so to express myself. In the amorphous albuminous mass which we call the egg, each principle, without any straying, takes its proper place: here, we have the calcareous phosphates, and there, the phosphorus, the fatty matters, the fibrine, the hair and nails, each finding their places with an order and method which clearly demonstrate the existence of properties different from those of inorganic matter or dead organic matter. Again, in that living organism, the fecundated egg, chemical actions which are all decreed, regular and of unerring perfection, concur in promoting one object; but in the non-fecundated egg, there is chance, and that chaos of chemical reactions which manifests itself in dead organic matter. Chemistry plays its part in both instances, but that part is very different in each: and we must admit that there are special properties in the one case, because in it there are special results.

Gentlemen, forgive me for having made a digression which, perhaps, you have found out of place, and too long. The excessive admixture of physico-chemical science with our art has produced so much evil, and is calculated to lead astray so disastrously young men commencing the study of medicine, that, in spite of myself, I feel that I am exaggerating the danger, and withdrawing you from studies to which you are indebted for useful information.

Let us, then, return to our clinical inquiries.

The living organism, both in animals and vegetables, has proper-

tics, in virtue of which it accomplishes the functions of nutrition. Besides, there exist, especially in animals, organs which incontestably establish a co-operative purpose in the different parts of the living economy. In health, the different functions are performed with regularity; but in disease, the functions of nutrition and relation are modified. Whatever the nature of these modifications may be, they do not fundamentally change the properties of living matter; they only change its modifications. The properties remain unaltered :— "Quæ faciunt, in homine sano, actiones sanas, eadem in ægroto, morbosas."

When a morbific element is introduced into the economy, when it circulates with the blood, it there behaves itself like the different principles which are daily received into the system by digestion, absorption, and respiration. Some of these principles are wholly assimilated, and, consequently, are of the nature of food, while others contain materials which rebel against assimilation, and which, if absorbed, have to be eliminated by the different emunctory channels, and rejected by the stomach or intestinal canal, if they have been swallowed. You perceive that things proceed in natural order up to that point; that is to say, all goes on naturally in respect of alimentary substances containing non-assiminable principles which are necessarily expelled. But if among these non-assiminable principles there be anything which produces an active topical irritation, there will follow local inflammation, exercising an immediate or remote influence upon different functions, according to the more or less intimate degree in which the part affected is connected by sympathetic relations with other parts. If the agent, in addition to its irritant properties, possess the power of vitiating or altering the quality of the blood, or of acting directly or indirectly on the regulating power of the nervous system, you can conceive the greatness of the perturbations which will be produced.

But let us return to physiology. To sum up the preceding remarks, believe me that the relative vital processes, whether more or less complicated, ceaselessly demand organic modifications which have their counterparts in pathology, just as pathological phenomena have their co-relatives in physiological functions. What is the difference between the therapeutic stimulant and the alcohol or coffee which we imbibe daily at meals? What is the difference between the dulling drugs prescribed by the physician, and the enervating fumes of tobacco which constitute in the present day a part, so to

speak, of the life of the majority of the male population? Wherein consists the difference between food charged with spices, incorporated with highly stimulating condiments—between meat which the epicure esteems, because it is in an advanced stage of putrescence—and the morbific causes which excite and shatter the nervous system, or alter the constitution of the blood?

Animals and plants, however, are constituted with the power of selecting from food that which is suitable, and rejecting that which is injurious to them. This effort of selection is accomplished at the cost of an only transient inconvenience. The feverishness which accompanies digestion is, indeed, within certain limits, a pathological condition. It occurs several times a day without injury or lasting disturbance of the economy; but if there be an alteration in the functional instruments, the duration and violence of the disturbance reaches a state of disease; and likewise, if the instruments be perfect, but the work which they have to perform be beyond their organic power, an analogous disturbance supervenes, which is disease.

We can imagine that, in that condition which we designate inflammation (*la fluxion*), and inflammatory engorgement, as well as in the formation of all kinds of plastic deposits, each organic cell is in its ultimate analysis an animal in the most elementary form, with a mouth represented by the artery, an anus represented by the vein, and an amorphous mass represented by the parenchyma of the cell; the blood, the nutritive element, is its food. In the physiological state that which takes place is simply composition and decomposition, the tissue, at the same time, preserving its integrity, and undergoing no changes which are not purely physiological; but if the blood carries vitiated materials, or materials which are too actively nutritious, it is evident that something will take place in it analogous to that which I described as occurring in the alimentary canal under similar circumstances. The unsuitable materials will be badly received by the organic cell, and will produce within it morbid disturbances; they may either remain in it too long, or be expelled from it too quickly; or they may develop within it new phenomena of anomalous secretion. The duration of the disturbance set up is in proportion to the degree in which the materials are antipathetical to the living cell, in proportion to the degree in which they are irritating or too abundant. When the extraordinary afflux ceases, the properties of the tissue, for a time oppressed and disturbed, return to their normal state, the cure being accomplished in the same way

that a return to health takes place after a fit of indigestion. It is in this sense that we ought to understand the famous Hippocratic theory of the coction of humours in disease; to the mind of Hippocrates, normal digestion was nothing more than a "coction;" and he regarded the coction which takes place in disease as a process analogous to healthy digestion.

I am perfectly aware, gentlemen, that here theories leave much to be desired; and I know that they are not more acceptable, when the subject under discussion is the great class of nervous diseases which holds so large a place in pathology; but, as I have already had the honour of telling you, in studying the physiological processes assigned to the nervous system, and the hygienical causes which act more particularly on that system, one soon perceives that ultimately the laws are the same which, in the circumstances specified, preside over physiological and pathological processes. What I have said to you in respect of diseases *cum materia*, of diseases in their relations to the phenomena of digestion and nutrition, also apply to nervous diseases in their relations to the senses and the different manifestations more particularly originating in the nervous system.

We have just seen that, in accordance with the laws of physiology, nutrition cannot be accomplished in a certain time and manner without giving rise to transient perturbation. We have seen that the functional aptitudes suffice for the restoration of order. If we go a little higher, we arrive at the state of disease; the functional aptitudes remain the same; but a little more work, or some more toilsome exertion, are required to accomplish the pathological than the physiological function. Though the apparatus be sufficient for the work, though it does not the less possess the fitness and power bestowed upon it by nature, it requires more time for performing the pathological function, and meets with more difficulties in accomplishing it. If these difficulties are not insurmountable, a cure takes place—a cure wrought out in virtue of the innate properties of the matter aggregated and constituted in organs; if, as unfortunately too often happens, the difficulties are insurmountable, the result is the destruction of the function or the organ, or the destruction of both. It is not the less true that, to living tissues, to organs, to apparatus, certain powers are allotted, which survive the most violent shocks, and by the instrumentality of which powers, physiological and pathological processes are accomplished. It is correct, therefore, in a figurative sense, to say that nature has a tendency to effect

a cure; but this statement does not imply that the tendency may not be met within the living body by the insurmountable obstacles of a worn-out state or a destruction of organs; and external to the body, by a violent and malignant operation of morbific causes. He who is a thorough believer in this inherent power of tissues, will be less disposed to act, more circumspect in his therapeutic assaults, and will better understand that the physician sometimes discharges his duty best by restricting himself to observing and directing the vital forces. We have too much faith in ourselves, and are too distrustful of that which I metaphorically call nature. We do not sufficiently recognise the fact that, when once the stir-up is given—pardon the vulgarity of the expression—things resume their normal style, and that there is nothing which the physician ought more to respect than the return of the natural functions to activity, as that will do more to bring about a cure, than all the agents of the *materia medica*.

When under the influence of that particular modification of the economy, which (for want of a better name) we call inflammation, an effusion of serosity and plastic products takes place into the pleural cavity, we try to interfere, and—we will say it—we interfere usefully in a tolerably large number of cases; but it is as to the limits within which successful intervention is practicable that the majority of physicians are most ignorant. To look at the pertinacity of our medications, the incessant and tumultuous activity of our therapeutics, one would suppose that it is our duty to distrust nature, that we are jealously desirous of doing all ourselves and without her aid. When inflammation of the pleura is at an end, there remains a something, and that something very plainly appreciable by auscultation and percussion—I mean effusion:—this will occupy our minds, both before and after it occurs, more than the local lesion which gives rise to it. We are slow to believe that when the inflammatory orgasm has ceased, the great organic cell, which we term the pleura, can return to its normal aptitudes, and perform that function which elementary organic cells are constantly performing in the process of nutrition. From that time, the pleura proceeds to absorb and digest the morbid products which it contains; and this it is generally able to accomplish, though in most cases the work is slowly done. I at once admit that paracentesis of the chest will save the pleura a great deal of work, just as I grant that copious vomiting is the best and most salutary of remedies when the stomach is sur-

charged; nevertheless, when the effusion is not excessive, when there is no irremediable tubercular deposit in the lungs or on the surface of the serous membrane, the natural innate functions of the pleura suffice for the absorption of the effused fluid and the accomplishment of a complete cure.

In the same category, there is a multitude of chronic diseases. When an exostosis supervenes under the influence of the syphilitic poison, beware of supposing that the lesion ought to be pertinaciously pursued as long as the bone and periosteum remain swollen. The venereal virus has been long ago conquered, and the exostosis, or other lesions which remain, are only evidences of its past action. If the practitioner discontinue his treatment, the functions of assimilation, distributed to all the tissues, will prove sufficient to cause the disappearance of that which a too protracted medication would, perhaps, have allowed to remain. Homœopaths, very unintentionally and unwittingly, I admit, came opportunely to teach us to recognise the inherent forces of the living economy. Their successes, based with precision upon cures which they attribute to themselves, but which belong exclusively to nature, have been useful lessons to us. They have taught us to rely a little less on ourselves and a little more on the wonderful aptitude of the tissues and apparatus which constitute the animal machine.

Again, gentlemen, do not forget that, in acute diseases, the time for useful treatment passes away rapidly, and that the expectant system soon finds its opportunity; and while we admit that in chronic diseases, the active, patient, reiterated interference of the physician may be advantageously continued over a long period, it is nevertheless sometimes very necessary to stay the hand, though full of medicaments, and wait for a few days. It often happens that, when thus waiting, we see the awaking of the normal functions from a state of slumber, suffocation, and perversion, and have the good fortune to witness powerful manifestations of that which is called, without a sufficient comprehension of the term, the *vis medicatrix naturæ*.

After a few months of study, the student ought to collect and write out cases; he will thus acquire the habit of examining patients —of scrutinising appliances and proceedings, of discriminating the symptoms which are of most importance and significance; in particular, he will learn to know the usual course of diseases—a kind of knowledge the most valuable which the practitioner can possess.

I would fail in my duty if I did not lay strong emphasis on the words I am now going to utter—*to know the natural progress of diseases is to know more than the half of medicine.*

But do not imagine, gentlemen, that it is easy to acquire this knowledge. There are many causes which place almost insurmountable obstacles in the way of this essential study. Most physicians entertain so exalted an opinion of the power of their art, as to believe it to be a dereliction of duty to abstain from treatment when they have before them an acute or chronic case. They institute active treatment, which of necessity disturbs the normal evolution of the disease; and even when this treatment is useful, it prevents them from ascertaining what would have taken place if matters had been let alone; when the treatment proves injurious the observer is left in a similar kind of perplexity. It must be granted that if we who have grown old in hospital and private practice, experience so much embarrassment in ascertaining the natural course of diseases, your difficulty will be much greater. You may well ask:—Where is the thread to guide us through the inextricable labyrinth?

There is, however, a sufficiently easy method of acquiring this knowledge so important to the practitioner. Observe the practice of many physicians; do not implicitly believe the mere assertion of your master; be something better than servile learners; go forth yourselves to see and to compare! If, in spite of treatment the most varied and opposite, you perceive that a particular malady generally proves mild, you may come to the conclusion that, in respect of it, physicians are impotent, and that the mildness depends less on the treatment than on the inherent nature of the disease. Having made good this point, look about in the hospitals, and you will quickly find a great many individuals who enter our wards after having spent the first days of their illnesses at their homes without any treatment, and you will discover that a large number of these patients have come into hospital just when convalescence was beginning. These cases are among the most important which you can observe. Compare them with those which you have seen treated in hospital, noting, in both classes, the duration of the disease and the rapidity of convalescence; if it become evident to you that the advantage is on the side of those who had no treatment, or that the influence of treatment of the most various kinds was null, nearly null, or absolutely hurtful, you have already learned that the disease in question is an acute one, in which nature is more powerful than

the physician. Knowing, henceforth, the physiognomy of the disease when allowed to run its own course, you can, without risk of error, estimate the value of the different medications which have been employed. You will discover which remedies have done no harm, and which have notably curtailed the duration of the disease; and thus for the future you will have a standard by which to measure the value of the medicines which you see employed to counteract the malady in question. What you have done in respect of one disease, you will be able to do in respect of many; and by proceeding in this way you will be able, on sure data, to pass judgment on the treatment pursued by your masters.

But it is evident that, to arrive at the point which I have now indicated, you require daily attention, great love of truth, and much disinterestedness; and these are difficult requirements. Affection for a teacher to whom you have long been in the habit of listening, may lead you too readily to believe his assertions. I do my utmost to instruct you in what I believe to be the truth. Many of you, through a very natural feeling of deference (for which I am grateful), swear by the master's word, but I adjure you to seek yet other sources of instruction. I cannot do this as easily as you can; it is only by reading that I can become enlightened as to my faults, and correct my erroneous opinions. In addition to reading, you have to guide you the observation of the practice of twenty hospital physicians, carried out in wards freely open to you, and by men whose advice is affectionately tendered. I am grateful when you bring under my notice observations which enable me to correct a mistake. Every year I am indebted to active, devoted young men for the opportunity of learning facts with which I was unacquainted, and reviewing erroneous views which I had long been teaching. In such opportunities I find a very agreeable reward for my efforts to be useful, and for the love I bear to my pupils.

An understanding of the natural course of diseases is, then, as I have just said, the most important kind of knowledge which a young physician can seek after. It is with the aid of this compass that he steers with certainty through the difficult study of therapeutics, and is enabled to gauge the value of systems which succeed each other, only that they may in turn be speedily crushed by those which arise in their stead.

There is no kind of practice, not even the fooleries of amulets and homœopathy, which may not yield you very useful instruction. As

enlightened observers of the wonders attributed to secret remedies handed down in families, and fervently propagated by the believers in all religions (even by those who pretend that they are above such prejudices), you will see morbid phenomena defile before you in regular order, and without having anything wherewith to reproach your consciences, you will get ideas from what is passing, which you could not derive from your own researches. In point of fact, gentlemen, the physician, worthy of the priesthood to which he has devoted himself, has no right to place on one side his beliefs, even though they be false, that he may experiment upon his patients, and wait with curiosity to see what "expectation" can do for them.

I have long been disposed to doubt the efficacy of medicine in acute pneumonia. Long ago I was tempted to leave nature to bring to a favorable issue this disease, against which we are all disposed to act so vigorously; but I have not yet dared so to act. Antimonials, emetics, and digitalis, are my chosen weapons; and I should consider that I failed in my duty if, convinced as I am (perhaps erroneously) of their great utility, I did not employ them, that I might see in what manner nature would bring the disease to a conclusion.

Abstinence from treatment answers admirably in mild diseases, and one may, without dereliction of duty, study their natural characters left undisturbed by the intervention of art; but when there is danger, and we believe that we possess a remedy capable of removing that danger, conscience calls out to us to be doing, and brings us back to active treatment, even when, for a moment, we were about to yield to the seductive influence of a culpable curiosity.

This abstinence from interference which I have now censured I, however, entirely approve, nay, I proclaim its opportunity, when we have to deal with diseases against which all treatment has proved useless. In such cases, waiting teaches us at least one thing—that there are remedies which are hurtful, and that it is better to do nothing than to do mischief. But, in these very cases, if it be incumbent on us to refrain from treatment, that we may understand the natural course of the disease, we must not too absolutely act in this way, and it is our duty to yield to those who, rightly or wrongly, believe that they have found a useful remedy. In incurable affections, in affections which, though often curable, are grave, only yielding slowly, and after leading the patient through the greatest perils, therapeutic attempts are allowable, if they are corollaries from

facts acquired under analogous circumstances, or from the successful experiments of others. When a patient runs an imminent and certain risk, it is justifiable, or at least it is excusable, to use every remedy, as in such a case we cannot make bad worse. Still, even in such cases, our therapeutic action must be defensible in theory and by an appeal to analogy.

In presence of a child dying from suffocation in croup, it is intelligent, and accordant with powerful analogy, to act surgically, by affording an exit to the foreign body, and allowing air to enter below the obstruction in the larynx. Even when in such a case success does not crown the daring of the operator, his conscience will be absolved—and that is the great point. For centuries, paracentesis of the abdomen has been practised for the evacuation of serous effusions. Why limit the employment of paracentesis of the chest to purulent effusions, as has till lately been the practice? Have I not been justified in acute pleurisy, with suffocation impending, when I plunged my trocar into the pleura? Tracheotomy and puncturing the thoracic walls may prove useless, but still, if experiments be allowable under any circumstances, they are allowable in cases such as I have now indicated.

So long as the man of art only makes experiments of this kind, he will be forthwith absolved by his own conscience (and that is the most important matter), and he will likewise be acquitted by his peers, who sit in judgment on his conduct; while, on the other hand, he will be condemned, and justly branded, if the experiment has been performed merely to gratify curiosity. But how much more blameworthy is the man who experiments in such a fashion in an hospital, where there is not that feeling of responsibility which often makes the private practitioner tremble; where there is no necessity to guard against a compromising of position; where patients are under absolute authority, and may for disobedience be dismissed from hospital, and turned adrift without asylum or succour.

Strive, gentlemen, if you become witnesses of such misdeeds, misdeeds very rare, thank God! strive not to imitate them, lest you lay up for yourselves remorse to follow you to the end of your career. The physician has the right to experiment, but within certain limits, and under certain conditions which I have in part indicated, and which I desire still farther to explain. To understand properly the nature of this right, it is necessary to know the way in which practical and therapeutical views are acquired. I have already told you

that most of the ascertained facts in therapeutics have proceeded from empiricism; but I have taken care to let you understand that, although the primitive fact be purely empirical, its applications pertain to the intelligence of the physician who has discovered them. I have already told you that the intelligent physician perceives in a fact something which others do not see in it, and that it is in consequence of this that the fact enlarges his horizon. The inferences, however, from an elementary fact, will only have value in proportion to the extent to which experience is developed; and experience can only be acquired by experimenting. There is not a physician in the world, unless he be stupid and dishonest, who experiments without some other motive than merely to state results. He is led on by one or several facts already ascertained, and his tentative proceedings are in reality legitimised as he proceeds, either by anterior ideas supplied by chance or a combination of chance with attentive observation of facts.

When the women employed in picking the stigmata of saffron have frequently had to complain of an excessive menstrual flow, the fact, one of common notoriety, could not but make an impression on the minds of physicians even the least intelligent; and from that point there was but one step to the discovery of the therapeutic action of saffron as an emmenagogue, and to a recognition of its power of frequently producing abortion.

How did we come to try to repress the fleshy granulations of a wound by the use of fused nitrate of silver? I do not know. But this practice, now so very common as to be left in the hands of medical novices and complete strangers to our art, has conducted practitioners to a course of experiment most prolific in results. Perceiving the resemblance between the catarrhal affections of mucous membranes and the granulating surfaces of wounds, they asked themselves, whether it might not be opportune to apply the same caustic to mucous surfaces in such affections; trials, at first cautious, gave such encouraging results, that the experimenters became bold, and solutions of nitrate of silver, at first applied to the pharynx and mucous lining of the mouth, have passed into everyday use in the treatment of inflammations of the mucous membrane of the nose, eyes, urethra, vagina, and even of the intestine.

But if the most energetic of caustics was so evidently useful, might not one expect the same results from other substances of the same class as nitrate of silver? The sulphates of copper and

zinc, corrosive sublimate, and solutions of potassa, soda, and ammonia, tried in succession by different practitioners have responded favourably, and every day this field of experiment is becoming enlarged. It was soon perceived that the primary effect of these different agents was analogous to that produced by inflammation, and it was easy to understand that inflammation artificially induced in tissues already the seat of inflammation, led to a cure of the original inflammatory attack. When this view was once acquired—a view, as you have seen, wholly due to experiment—there flowed from it the great therapeutic principle of *substitution*, which, at present, rules supreme in medical practice.

Thus it is that, step by step, therapeutics have become enriched; it is thus that, day by day, experiment has added one fact after another to our store. When facts were seen to present analogies, and when their relations to each other became understood, groups of systems were formed, which afterwards expanded, and constituted a sort of body of therapeutic doctrine, doubtless leaving beyond its limits many unexplained facts, which must remain provisionally within the domain of empiricism, until they can, at a later date, be placed in a special category, and in a general system.

Since the time of Sydenham there has assuredly been no advance in the treatment of intermittent fever, but the empirical opinion as to the powerful influence of the Peruvian bark is for all that not a crude notion, which it is sufficient to announce to give currency to with the general public. When the Countess Del Chinchon, in the enthusiasm of her thankfulness, sent to Rome and Madrid the miraculous powder which had cured her of fever, the proceeding was only empirical; but Peruvian bark, when adopted and tested by Torti and Sydenham, became a remedy administered according to methods which it was the province of great physicians to determine. It is thus that even when a remedy is only applicable to a special disease, when no theory, no process of inductive reasoning has led to its employment, when, in consequence, it seems to belong exclusively to empiricism, the physician may still intervene with his intelligence, and institute a plan of treatment with a single medicine. He will not attempt to systematise, he will not be able to try even the smallest series of remedies, but he will form opinions as to the fitting time for using the special remedy, and as to the nature and duration of its influence in individual cases. He will regulate the doses as to their amount and frequency of administration. He will inquire

into the means of rendering the remedy as inoffensive as possible, and he will study to discover, in the special symptoms of the case, whether there be any other indications which experience has already taught him to appreciate and fulfil. He will see that the anæmia which accompanies marsh poisoning yields with ease and certainty to the same remedies which succeed so well in chlorotic cachexia, and in such cases iron will become, in the hands of the physician, a useful adjuvant unknown to the empiric. The empiric can cure a paroxysm of fever; but it is the physician who cures the fever in the totality of its phenomena. It is the physician who makes a diagnosis, which it is impossible for the empiric to accomplish. To know that a patient has daily a paroxysm of fever commencing with rigors, and followed by heat and sweating, is knowledge of the commonest possible description—it is not diagnosis; but to know that the paroxysm of fever is unconnected with concealed inflammation, deep-seated suppuration, or an idiosyncrasy of the nervous system so common in some women—to know that it really is the manifestation of the influence of marsh miasmata—is a complex conception which can only exist within the domain of the physician. To appreciate the present influence of that poisoning, the influence which it has exerted and is destined to exert on the patient, and so to be enabled to adapt the duration and activity of the treatment, in accordance with the seriousness of the case, is beyond the resources of the empiric.

When it is necessary in simple or pernicious fevers to find the thread which leads up to a knowledge of the cause and essential nature of the disease; when it is necessary in a man who has cough, difficulty of breathing in the horizontal position, blood-stained expectoration, and stitch in the side, to lift the deceitful mask and identify the intermittent fever which demands, imperiously and immediately, large doses of cinchona; when it is necessary to search out and discover the same indication of treatment amid a turmoil of violent symptoms in a protracted paroxysm of intermittent, which assumes the form of continued fever; when such contingencies arise, it is the physician who can alone usefully interfere, and the vulgar empiric, who has by chance stopped a fit of intermittent fever, is incapable of skilfully wielding the therapeutic weapon, even in the simplest cases, and if he has to do with forms of intermittent fever, in any degree complicated, he is unaware that he ought to employ the bark.

Though empiricism, therefore, has furnished the original sugges-

tion of the employment of cinchona, although up to this day we are quite unable to explain the action of this powerful drug, physicians have taken possession of its unexplained action, have extended its beneficial sphere, and have, with a medicine which is empirical, instituted a system of treatment which is not empirical.

The mission of the clinical professor is quite different from that of the professor of pathology. It is the province of the latter to trace systematically the history of diseases—to point out their causes, nature, symptoms, and treatment. He ought, as much as possible, to classify them in nosological order, and to present, as far as in him lies, an exact, well-defined picture, with which all the facts ought to correspond. The duty of the clinical teacher is not of the same kind. If a series of patients suffering from a similar affection present themselves in the wards, he will no doubt, profiting by the occurrence, sketch a picture of the disease; but the description given will be to a certain extent the recapitulation, the corollary, of facts observed; he will much more frequently have to study with his pupils the forms which the malady takes in virtue of particular medical constitutions of the atmosphere, and the idiosyncrasy of each patient, than to give a general picture. It will be specially incumbent upon him to show in what respect, and in what degree, the case under observation varies from classical descriptions: to point out the innumerable modifications in respect of the form, general character, and treatment of diseases due to the different conditions under which the patients are placed. In a word, while indicating the points in which the case conforms to classical models, he will describe with the most minute care the points in which it differs from them, endeavouring at the same time to show upon what these differences depend. It is precisely this kind of fundamental study which makes the practitioner.

When the pupil has finished reading a treatise on medical pathology, he fancies himself already a physician, but when confronted with a patient, he experiences the strangest embarrassment, and soon finds out that he has no ground to stand on. 'I do not speak only of embarrassment resulting from not being accustomed to the task—*that* he feels, and it is comprehensible that he should—but what I wish to tell you is, that the signs and symptoms have to him an air of utter strangeness. In his pathological treatises, the student has seen pulmonary tubercular phthisis delineated in striking features, the signs furnished by auscultation and percussion have been clearly

and methodically laid down; the author has insisted on delicate shades of variation and on numerous exceptional circumstances; but these variations and exceptions have made little impression on the young man, though they are the very things which most frequently strike the true clinical observer as noteworthy in the incipient stage and during the course of phthisis. He only who, during many months, and in the wards of an hospital, has studied tubercular phthisis in all its forms and in all its symptoms, can comprehend the immense difficulties which occasionally encompass its diagnosis.

Gentlemen, I grieve to see beginners pressing round the beds, during the visits which immediately precede the lectures in the theatre, and absenting themselves from the wards on the days on which no public lectures are given. Let me tell you that such a course of proceeding is most unprofitable. From the crowding, it is with difficulty, if at all, that you have been able to feel the patient's pulse or judge of the expression of his countenance; you have not ventured to fatigue him with an examination not to be repeated without danger; whereas, in the services where there are few pupils, and even in the clinical wards on the days when there are no lectures, you have abundant leisure to interrogate and examine the patients, to ask explanations from your teacher and fellow-students: from examinations made in this way, you will carry away much most useful information, and it will be exactly such information as will enable you to understand the public discussions upon which the professors enter.

I know how much room there is for improvement in the clinical teaching of the Faculty of Medicine of Paris. I know that young men are not sufficiently exercised in the examination of patients; but whatever is wanting in the official teaching, you can supplement by private instruction. Most of our young hospital physicians and surgeons—the *agrégés* of the Faculty—who have nearly all obtained hospital appointments by competitive examination, are most anxious to direct students in the difficult study of diseases; and I must say that there is not a town in the world where this kind of instruction is given with greater zeal and liberality than in Paris. The immense hospitals of this capital are open gratuitously to Frenchmen and foreigners; every morning more than fifty services offer to industrious young men the most fertile and varied elements of study, and when students who have taken advantage of their opportunities come to attend the lectures of the clinical professors, they do so with profit.

You must perceive that it is physically impossible for the clinical professor to exercise his pupils in auscultation and percussion, without a knowledge of which, however, they must remain unacquainted with a great many diseases. It is impossible for the clinical professor, when surrounded by a hundred and fifty or two hundred students, to teach them by methodically interrogating the patient, by discussing diagnosis, and pointing out treatment; that can only be done in the private services, and in the clinical wards upon occasions when the professor is not obliged to enter the theatre at a stated hour, when he is not surrounded by a crowd of pupils desirous to listen to the master's authoritative words, rather than to the hesitating talk of the timid scholar making his first professional attempts with patients.

I cannot, gentlemen, sufficiently impress upon you that anatomy is never learned in a course of lectures; you must have the dead body, and it must, moreover, be a dead body surrounded by two or three students dissecting along with you, and one of whom is sufficiently intelligent to direct your proceedings; the clinic stands in the same category, and can only be learned in the hospital, with the aid of an *interne*, or *chef de service*, to teach you the art of putting questions, and of conducting methodically the examination of a patient.

I do not wish to speak to you here about the particular methods of interrogating patients; the methods are very useful, but they are described in all your manuals. When I say that they are very useful, I wish, at the same time, to warn you against certain excesses in their employment, which always wound me deeply, and which you will never see me commit. You must remember, gentlemen, that hospital patients are poor creatures forced into our wards by distress and want. This fact ought of itself to be enough to conciliate our esteem and inspire our respect for them. With regard to men, I admit that we may act with less reserve than with women. Upon the whole, there is no great inconvenience, on the score of modesty or propriety, in uncovering a man to examine the surface of his body; but this examination is not permissible if it involve any risk to health; and here I must remark, that young men, when they strip patients for examination, too often forget that if the skin be covered with perspiration, it cannot, without great danger, be exposed to the contact of cold air. It is not permissible to any one, not even for the sake of science, to prolong an examination by

auscultation and percussion to such a point as to exhaust the strength of the poor patient, and it is preferable, except in cases of imperious necessity, to leave an investigation incomplete, or to discontinue it till the evening or next morning, than to shatter a patient already profoundly prostrated.

What I have just said applies to both sexes; but when the patients are women, the physician ought to remember that he has daughters and sisters to deal with, and never to allow his examination to assume the appearance of a culpable curiosity. The fallen women who enter the hospitals (and they are a very numerous class of patients) respect us only when we respect them. They judge us favourably from a reserved manner, for which, perhaps, they would elsewhere banter us; and I rather think that they carry away with them from hospital better feelings when they have been treated with as much consideration as the poor virtuous girls who occupy the adjoining beds.

It is quite possible to make, with the most perfect chastity, investigations, which seem to be the reverse of chaste; and, provided they are useful, especially when they are so regarded by the patients, they are acceded to, and often even with gratitude. This is not a question of prudery, but simply one of good breeding. Bear in mind that the physician's chance of success in his difficult career is all the greater, the less he forgets, in his intercourse with patients, those rules of propriety which constitute the appanage of a good education.

When your clinical studies are more advanced, when you can with real advantage make a digest of the knowledge you have acquired by systematising your facts and cases, you will estimate more correctly than you now can, the value of the different nosologies and nomenclatures which so unfortunately encumber our art. All nosologists have believed themselves to be in the right, all have pitied their predecessors, and all have been thoroughly convinced that the classes, orders, genera, and species of diseases, were never grouped upon principles more legitimate and natural than those they have adopted. They have all been convinced that the new names which they have imposed on diseases form an imperishable nomenclature. What remains of nosologies and names? Nothing which has not been consecrated by the assent of all ages, nothing which has not been adopted by the generality of physicians—nothing save the *débris* of all nosological systems and nomenclatures.

People give themselves a great deal of trouble to torture the Greek language, and to heap up learned solecisms; they labour long to collect the most preposterous and fantastic names; but the good sense of the public executes prompt justice upon all these absurdities, and every one remains faithful to the old names, every one is satisfied with them, and every one understands them infinitely better than the barbarous words which it was wished to substitute for them.

The manufacturers of nomenclature ought to look well about them, to see what are the terms which have survived, and which will survive for ages to come, continuing fresh, intelligible, and triumphant, in spite of the attacks of which they have been the object. I have no desire to defend such names as St. Vitus's dance [*danse de Saint Guy*], epilepsy, hysteria, variola, scarlatina, whooping-cough [*coqueluche*], mumps [*ourles*], cholera, dysentery, and many others of the same sort which it would be tedious to enumerate; but tell me, gentlemen, whether it be not true that the term "*danse de Saint Guy*," although originally applied to another nervous affection, has been used by all physicians, without a single exception, from the time of Sydenham downwards, to designate chorea, that fantastic neurosis which we so often see, in infancy and adolescence? I admit with you that the word "*coqueluche*" has, in a nosological sense, no meaning; but if it be a fact that, in the middle ages this name was given to an odd sort of epidemic pulmonary catarrh which made it obligatory on the sufferers to cover their heads with a kind of cowl called *coqueluchon*, it is equally true, that there is not a medical practitioner in the world, nor even a person completely ignorant of our profession, who could make a mistake as to the meaning of the word "*coqueluche*." With you, I admit, that it is singular to have given pox the name of *mutual love* invented by the shepherd of Fracastor: but nevertheless, we know what is meant by *syphilis*, and no name, were it ever so Grecian or barbarian, could be as good as that which all have adopted. Generally, people speak and write with a desire to be understood, and words which are applied with precision and exclusiveness to the things which it is wished to designate, are necessarily the best: and they are all the better the less they possess a nosological signification. The names which I have just cited are perfect, precisely because they imply no adhesion to a medical doctrine; that is the reason why they are excellent; and it is because their adoption does not constitute an article of pathological faith, that they have been universally adopted.

We are, in the existing state of matters, at liberty to place diseases where we please in our list; but their nosological position implies neither the necessity nor the propriety of changing names. We ought to be sufficiently modest and sensible to feel that we know nothing to the foundation, and that a synthetic, purely conventional term, is better than a descriptive one, which will always have the inconvenience of being too short to suffice for the requirements of description.

When the immortal Jussieu classified plants, he was careful not to change the names of those which had been known for ages by the same names; he did not change names given by Tournefort and Linnæus; he accepted those bestowed by Virgil, Theophrastus, and Dioscorides, as well as the popular appellations of flowers and trees. The apple remained the apple, belladonna kept its elegant name, mandragora retained the appellation which had made it so celebrated and formidable; he allowed the hemlock of Socrates to keep its ancient name, and was satisfied to classify vegetables according to affinities of structure and organisation, always, when it was possible, respecting not only the names but even the epithets of Linnæus. Where should we have been in the study of botany, if Linnæus had refused to accept the names of Tournefort? or if Jussieu had superseded those of Linnæus, and if Lamarck and Richard had conceived the idea of making themselves celebrated, by substituting for the nomenclature of Jussieu one more to their own liking?

It is evident that for new diseases new names must be found; but even in such cases, it is important to avoid nosological appellations. I much prefer the name of Bright's disease [*maladie de Bright*] to that of albuminous nephritis [*néphrite albumineuse*], not only because it is a homage to the illustrious English practitioner who was the first to give a good description of the disease, but still more because it imposes on me no doctrine nor opinion. Scarcely forty years have elapsed since the publication of the beautiful researches of Bright, yet in that time they have been followed by twenty theories in relation to the disease in question. Let diabetes mellitus [*diabète sucré*] retain the name it has so long possessed, and do not be in a hurry, after reading the ingenious experiments of Claude Bernard, to give a name suggestive of irritation of the fourth ventricle, or irritation of the liver; wait, and even when you are well-informed regarding the cause and nature of diabetes, abide by the old name, which proclaims no foregone conclusion. Vulgar, universally received names are a

sort of current coin, the denomination of which one cannot alter, without introducing confusion into the commerce of science. Rest assured, that systems of nomenclature (of which absurdity is the least fault) are not worth tainting the memory with; and earnest physicians ought to abstain from employing them, quite as much from respect to philology, as from a true desire to promote the progress of our art.

It would no doubt be desirable that in medicine, nosology, that is to say the systematic arrangement of diseases, preceded clinical study and therapeutics. If the system was true, the results would be necessary, and consequently, easy; but unfortunately, many systems of nosology have been tried, and not one of them has survived its author. Clinical studies, particularly therapeutics, are every day giving the lie most cruelly to the fundamental propositions of these artificial sciences, and there is not a physician, who, even after a short practical experience, would not execute summary justice on all nosologies and nomenclatures.

I admit that nosologies are an assistance to the student, at the commencement of his medical studies, just as the very false system of Linnæus may greatly aid one in his botanical novitiate; but, gentlemen, when you know enough to be able to observe for yourselves [lorsque vous *connaissez* assez pour pouvoir *reconnaître*], allow me this sort of play of words—hasten to forget nosology, keep beside the bed of sickness, studying studying each patient, each disease in each patient, proceed like the naturalist who studies the plant in its individuality, in all its elementary parts, and in all its varieties, ignoring classes, families, genera, and species, till his knowledge is sufficient to enable him to systematise, that is, till he can understand and discover sufficiently to establish analogies.

I recognise the fact that you bring into the clinical wards your nosological theories; I even grant that they assist you at the commencement of your study of diseases; but still, I say, that in proportion to the extent to which facts become unravelled before you, in proportion to the degree in which you have examined them, and acquired an aptitude for comparing them, you must hasten to get rid of your scholastic trammels. Hasten to shake off the master's yoke; exercise your mind and judgment, and compel yourselves to systematise for yourselves! By pursuing this course, you will by study either arrive at the same results as your predecessors, or you will form opinions from a different point of view: in either case

your views will have become a personal acquisition. I do not wish you to efface from your memories all that you have heard in lectures nor to withhold belief from everything which you have not tested, but you must guage by your own personal observation every doctrine which you are taught; you must collect and classify facts from your private practice, and afterwards systematise them. Though the systems which you thus construct will be far from embracing all the facts of medicine—not even all those which you yourselves have studied—the work of construction will teach you to perceive immediate and remote relations, and will furnish you with a sort of stepping-stone, by the help of which you will be able to add other facts in succession. It is by intellectual gymnastics such as I have now recommended, that you will attain a power of inductive reasoning unknown to those who, less through respect to those who have opened to them the gates of science, than through laziness or incapacity, servilely remain in ruts hollowed out for them by their masters.

I like much to see in youth an independent, somewhat adventurous mind—a kind of mind which might in later years be a source of danger, when it was necessary to apply practically to patients the opinions formed by hospital study.

The time for subordination comes apace; the pupil is about to become the physician! It is then that reading—the written experience of others—ought to come in aid of personal observation; it is then that we form judgments upon the rules laid down by our predecessors and masters; it is then especially that we become modest, for we then very quickly perceive that all we have seen and estimated, has been seen and estimated by others, and by others more eminent than ourselves: we perceive that their generalizations are of a higher and more prolific character than our own, and their systems better compacted; and when questions of medical or surgical therapeutics are under discussion, we soon discover that the plans which they recommend have been ripened and regulated by experience deserving the highest respect.

But our reading and the lessons of our masters profit us in proportion as we have personal knowledge and ideas of our own at command. The deductions which eminent physicians have drawn from the facts they have observed appear quite natural, and we recognise in them opinions with which we are familiar, because they had arisen in our own minds, and the views which are new to us

have less of novelty, from the fact that we are more naturally led up to them. A pupil feels pride in having arrived at conclusions similar to those previously adopted by masters of the art, at having devised a therapeutic proceeding, or an operation already long known in practice. He then understands better how worthy of respect are his predecessors who have done so much for the healing art, and his confidence in them increases in proportion to the number of ideas which he finds he has in common with them. The man who has always responded to the suggestion of another, and has not acted from his own promptings, will never be so eminent a physician, nor so ardent an admirer of our great predecessors, as he who has been educated almost up to their level, or who, though still young, has at least like them, sought out new paths.

Between pupils and teacher, there ought to exist a species of reciprocity, in which the former receive the largest share of benefit, but in which the latter is also, to a certain extent, a gainer. Much have I congratuated myself that I had encouraged the young men by whom I was surrounded to think for themselves, to communicate their ideas to me, and to converse with me on what they believed to be their discoveries. How often have these ardent spirits reanimated my senescent mind, and shown me new horizons! How much have I learned in the familiar chats which take place in the wards! I have always felt pleasure in promoting and assisting the researches of my students; and while my experience has not been useless to them, their enthusiasm has stimulated me, and has prevented me from rusting with that self-conceit of teachers, who are apt to fancy that they have nothing more to learn in the very difficult art of medicine.

The man who is convinced that there is something to be gained, will always gain something; and in the most beaten paths something new can always be found, provided it be sought for with ardour and intelligence. Hence is it that when a man, ardent and young, yokes himself to an idea—permit me to use this vulgar expression—he makes discoveries, arrives at new views, and teaches his masters things of which they were either ignorant, or which they had only dimly seen. Doubtless, gentlemen, the young physician who takes this adventurous road, often loses his way, and is obliged, after long efforts, to retrace his steps; but rest assured he has gained something by the mental discipline undergone, and he will be the more apt

to learn, the more frequently he has exercised his mind and applied his attention to original researches.

Let us inquire, then, whether the plans of study have always been bad, whether those pursued at the present day are the best, and whether they are adequate to establish medicine as a science.

In considering these questions, I shall at once leave on one side the preparatory sciences, which bear the same relation to the medical art as the laws of light bear to painting, or stone-cutting to architecture; I shall, therefore, say nothing here of physics, chemistry, or natural history, which are unquestionably useful in medicine, but no more make the physician than the science of perspective makes the landscape-painter.

Medicine is the art of curing, and it is nothing more than that; to cure is its object, and all our plans culminate in medico-chirurgical therapeutics. I willingly admit that some branches of accessory knowledge are good in themselves; but when the student has acquired them, I ask, how is he to become a physician? Several methods of proceeding present themselves, but, without exception all of them, in all periods, and in all schools, have been based on previous observation of facts. So far as I know, it has never entered into the mind of any reasonable man to suppose that we can know without looking, or look without seeing. People, therefore, have always seen and always looked, when they wished to acquire information upon any point, or desired to systematise their knowledge.

Attention necessarily implies comparing; and when comparison is not explicitly, it is virtually instituted. Thus, every physician has seen, looked at, and compared. It matters little to say that there is nothing to prevent him from seeing badly, from seeing with bad eyes, or with the eyes of other people, from looking at, and comparing things badly. What I here wish to establish is simply the fact that, everywhere and with all persons, the elementary procedure is the same. The subject, then, of *methods of observation* resolves itself into a consideration of how we ought to observe, how we ought to compare our observations, and how we ought to form our opinions.

A conception of the nature of tangible objects is acquired by a simple perception of all the phenomena by which objects manifest themselves. This perception demands no intellectual effort; it requires attention and memory, and—as memory may prove treacherous—registration of the observed phenomena.

When the blind man of Geneva made his marvellous researches into the habits of bees, he used the eyes of the most ordinary peasants, whose attention he guided; and these most ordinary peasants, the material instruments of his intelligence, enabled him to ascertain facts, and acquire general conceptions.

All of you, after some months' experience, by adopting a formula of examination for each structure, function and organ, can fill up a a sheet of observations in as complete a manner as your masters can; to enable you to do this, the only requisites are patience, and the amount of intelligence required for the drawing up of an inventory. Do not at that stage of your progress be too proud of your achievements, for you are then no better than the peasants who saw for Hubert of Geneva; your eyes have seen, as it were, the industrious bee return charged with honey and pollen to build the hexagonal cells; they have seen a bee larger than the rest surrounded by general solicitude, and followed by a crowd of lazy bees of a different shape and colour, ultimately undergo copulation, and observed that this was a signal for the massacre of all the non-working bees in the hive; they have seen the sides of the respected bee swell out; they have seen this bee reposing in the cells which the working bees have constructed of different sorts; they have seen the workers deposit honey in cells where something like a worm is moving; they have seen certain larger cells receive a richer tribute, and they have seen the worm contained in the latter become bigger than the others; they have seen these worms all at once assume new shapes, the larger becoming a cloud of bees of two very different forms, live together amicably till the smallest sized, which are armed, utterly exterminated the others; in a word, they have seen what is to be seen by paying attention. But the blind man understood what was seen; nature refused him instruments, so he made them for himself, just as Galileo made a telescope. He fructified the crude, meaningless notions of those whom he employed, and traced with admirable sagacity the curious habits of those precious insects—habits of which hardly the slightest knowledge had been previously attained.

God forbid, gentlemen, that I should here depreciate the value of the knowledge acquired by attentive and minute observation; the value of the results of such observation is immense; but I wish to point out that it has scarcely any claim to be considered an intellectual process. Without hewers of marble St. Peter's of Rome had never

been built, but it would make me indignant to see a hewer of marble fancying himself almost a Michael Angelo.

Since attention alone is necessary for the acquisition of facts in the rough, as the most commonplace minds are as well, or sometimes even better fitted for this kind of work, does it follow, gentlemen, that, scorning a modest occupation, you should leave to others the collection of facts, contenting yourselves with their arrangement, interpretation and systematisation? Even in a man grown old in harness, that would involve such an amount of aristocratic assumption as to be hardly credible, but which, to say the least of it, would be quite unparalleled in one who was only treading the first steps of his career. The sculptor does not take up his chisel to produce a Lacoon till after he has for a long time kneaded the clay, dashed out elementary forms in the rough, laboriously modelled shapes, and broken many a graving-tool on coarse marble. Persons who have despised laborious beginnings, be they never so gifted and intelligent, are only spurious and imperfect artists. See, then, and observe for yourselves, for you cannot understand and utilise knowledge acquired by others, unless you possess some which is of your own personal acquisition.

To the honour of all the great men who have rendered our art illustrious, it must be stated, that they have proclaimed the observation of facts to be an absolute necessity, and in the present day this necessity is more than ever admitted by those who preside over medical teaching. But if there be unanimity of opinion on that point, there is certainly no such concord as to the manner in which we ought to proceed to the interpretation of the facts observed.

At present, there are two principal methods employed for the interpretation of medical facts, viz., the *numerical*, called the *new* method, and the *inductive*, called the *old* method.

The former—the numerical method—has taken for its motto the celebrated sentence of J. J. Rousseau: "I know that the truth is in the facts, and not in my mind, which interprets them; and that the less I introduce my own views into my interpretations the more sure shall I be of approaching the truth."[1] The second—the inductive method—is that which has till now been followed by all great practitioners, whatever may have been their other doctrines;

[1] "Je sais que la vérité est dans les choses et non dans mon esprit qui les juge; et que, moins je mets du mien dans les jugements que j'en porte, plus je suis sûr d'approcher de la vérité."

and it is adhered to by the majority of the professors of our faculty.

The numerical method, which took statistics for its basis, and which had already been introduced into hygienics by Parent-Duchâtelet, was applied to the study of pathology and therapeutics by a man of undoubted scientific honesty, one endowed with an invincible patience, an ardent lover of truth—truth which he expected to attain with certainty. This method recognised the sovereign power of figures. Its advocates said—"The physician ought to restrain the flights of his imagination: it is his province severely to analyse, reckon up, and register results: this, and neither less nor more than this, is his duty. He must be actuated by the inflexibility of the just judge, who applies the law uninfluenced by passion or private feelings; by the rigour of the statist, who, in drawing up a table of mortality, pays no attention to causes of death, and confines himself to the computation of the chances of life in an entire population." Finally, the numerical method applies, in all its rigour, the calculation of probabilities to medicine.

The inductive method is a totally different procedure: it collects and analyses facts; but it likewise compares them, and does not always sum up their number. In place of the *necessary* result obtained from statistics, it seeks for something else, viz., the systematic relation and connection of facts: it interrogates facts, comments upon them, separates them, groups them, examines them in every aspect, with a view to eliminate from them something new and applicable. In a word, in opposition to the numerical method, it puts as much of its own as it possibly can into its interpretation of facts, well assured that by so doing it will approach more nearly to the truth.

The first part of the sentence of J. J. Rousseau, which I have just quoted, is nonsense. It is evident that facts, just because they are facts, are, of necessity, true: in this sense, to affirm their existence, points out what they are; and it is neither correct to say that facts are true nor that they are false, but simply that *they are*. The estimate of facts may be either true or false, but the estimate belongs to the mind of him who forms it, and in no degree whatever to the facts themselves: it is absurd, therefore, to say that "the truth is in the facts, and not in the mind which interprets them." The second part of the sentence has only a false appearance of truth: it is clear that if, in respect of two given facts, we confine

our judgment to pointing out the immediate link by which they are united, we put into that judgment the least possible amount of our own, and that, if we have not given much of a judgment, we have at least given one which is sufficiently sound. Nevertheless, even in forming judgments upon the most general relationships of facts, it becomes necessary to put in something of our own, because judgments are mental acts, and are essentially outside the facts. The question, therefore, to be determined is, whether we ought to put into our judgments as much of our own as we can, or whether, as seems to be the wish of J. J. Rousseau, as little as possible of our own. For myself, I can give an unhesitating answer to this inquiry. The more we lay hold of and point out numerous ways in which facts are related to each other, the nearer do we get to the complete truth, and the less complete the truth is, the less truth does it contain.

I do not reproach the numerical method because it numerates, but I reproach it because it only numerates: in a word, because it depends, like the mathematician, upon an absolutely exact result. I reproach it for counting too much, for counting too long, for counting always, and for declining to put any mind into the facts. This method is the scourge of intellect: it transforms the physician into a calculating machine, making him the passive slave of the figures which he has massed up: the greatest reproach which I cast upon it is that it stifles medical intellect. Those who admire the numerical method, applaud consequences which I deplore; they do not wish for the intervention of intellect; I do—I wish to see intellect exercising itself in all its power.

I am anxious to make myself clearly understood; I employ statistics, I even employ, if you like, the numerical method, provided it be only regarded as a means sometimes preparatory, and most frequently complementary; but I spurn it with all my energy when it pretends to be a method complete in itself, and capable of conducting us, as a matter of necessity, to the truth.

The numerical method leads to results which are, and can be, nothing more than crude facts and elementary ideas. These facts and ideas are food for the intellect which elaborates them. This method, moreover, presents but a very slight fundamental difference from that which has hitherto been universally employed. A practitioner of the past, who was studying measles, perceived, I presume, a primary fever, a rash, desquamation, and complications, of which

he took account—he registered his observations, and then he noted which facts were general and common, and which were accidental and special. Practitioners, then, of past ages acted in no different way from that I have now described, and so likewise proceeded in our own time, before the numerical method was invented, Corvisart, Bayle, Laennec, Rostan, Lallemand, Andral, Bouillaud, Calmeil, and many others. When they had examined in the closet the observations collected at the beds of their patients, they noted results, and then drew conclusions. What more does the numerical method do? It calculates rigorously. In place of saying "one hundred" patients, it says "ninety-nine," or "one hundred and four" patients; in place of saying (as Bretonneau first said) "in putrid fever, intestinal perforations occur in the ulcerated Peyerian and Brunnerian glands, and are seen rather frequently," it says "intestinal perforations are observed so many times in a hundred cases;" in place of saying "softening generally accompanies cerebral hæmorrhage," it says, for instance, "softening accompanies cerebral hæmorrhage sixteen times in twenty." The common method said, and still says, lobular pneumonia is a very frequent complication of measles, while the numerical method will tell you the relative proportion of cases which are, and which are not, complicated in that manner. It is, then, you see, a method of proceeding which has the appearance of being more exact; but, in reality, it does not differ from the other method.

If you observe with attention, you will arrive at the same principal conclusions by the inductive as by the numerical method. When I set myself to study whooping-cough, I quickly perceive that the fits of spasmodic cough almost always cease, or at least become much less frequent, when the patient has, than when he has not, had an accession of fever. I pointed out this observed fact in my clinical lectures before I employed arithmetic:—by-and-bye I made use of statistics, and then, in place of saying *almost always*, I said *so many times in so many cases observed*, which is just another way of saying *almost always*.

Do not imagine, gentlemen, that there is any reality in this mathematical exactitude; it is only a relative precision, for it changes under the observation of the same man, according to the year, the season, and the reigning medical constitution. Thus, it happens, that the same fact which was observed last year once in five times, occurs this year only once in ten times, and next year,

perhaps, it will only happen once in twenty times; so that your law, your true truth (*vérité vraie*) neither is, nor can be, absolute. If the pathologist endeavours to formulate the facts which twenty partisans of the numerical method have given, each as the utmost expression of exactness, he is obliged either to strike an average which will not be a true average to-morrow, or to return to those odious and detestable formulæ which it is desired to banish from medical phrascology—*sometimes, often, most frequently, generally.*

Of what use is this semblance of precision? When one of our colleagues showed the medical world the coincidence which exists between diseases of the heart and acute articular rheumatism, was that beautiful discovery received the less favorably because the discoverer said "*very often*" in place of "forty-four times in the hundred"? Was the influence of sulphate of quinine on miasmatic hypertrophy of the spleen less surely established when Bailly said "*almost always,*" than if he had said "*ninety times in a hundred*"?

But it will be alleged that the numerical method allows us to verify the assertions of a physician. Do you think, gentlemen, that if one wished to make a false statement, it would be less easy to do so by the use of exact figures than by the employment of the "*sometimes*" and "*almost*" phrascology? Do you think that the impudent, lying physician, if such there be, could not concoct a numerical result as easily as a general assertion. The one method would only give him the trouble of lying sooner than the other—it will oblige him to begin by fabricating historical details so that he may announce an exact result; while in the other case, he will, with less labour and hypocrisy, lie only in the false conclusion which he puts forth.

Thus it is that, although I concede to the numerical method, as now practised, a very minute degree of importance as a means of study, I recommend its employment, because it accustoms the student of medicine to pay attention, and enables him to appreciate better certain details which, though they do not escape a trained and intelligent observer, might remain unperceived by one less familiar with the sick.

The physician who popularised the numerical method at the same time introduced statistical analysis into the study of pathology, and the minute dissection of the facts observed sometimes led him to new information, not the less worthy of being known and recorded that it was of a collateral character. Rigorous analysis, then, is not

useless, and although it presents the very grave inconvenience of crumbling facts (*d'émietter les faits*), to use the happy expression of M. Bretonneau, in such a way as to disfigure them completely, it nevertheless makes us acquainted with some subordinate truths which will, sooner or later, acquire a certain scientific value.

If the application of statistics to medicine were not rated too high, if it were not considered as the very keystone of the arch of all science, and if it were simply regarded as a method of proceeding a little less imperfect than the majority of those hitherto adopted, I should only praise it and recommend it to you, because I really believe it to be useful; but there is so much noise made about such poor results, that I cannot conscientiously assist in deceiving young men by countenancing a charlatanic parade of exactitude and truth.

The statist desires too many facts; he is well aware that statistics are valuable only through multitude of facts, and he seeks everywhere for the means of increasing their number. There is nothing of this kind in the inductive method, of which I am now going to speak to you.

Bacon's "forest of facts," taken literally, has no great value, and as the expression is understood now-a-days, it has no value at all. Undoubtedly two facts justify a conclusion better than one fact, one hundred facts better than two facts, and a hundred facts better than a thousand; that is to say, one isolated fact does not convey its lesson. People say to you—Bring together facts; do your best to collect cases in as complete a form as possible; collect them passively, without exercising your intellect upon them; so far from permitting thought, till you receive fresh orders, repress every mental impulse; be the accountant who marshals figures, and thinks nothing about results till he has added up all the columns. I also tell you to gather facts, and to do your best to collect cases in the completest form possible; but from the moment that you have got one fact, apply to it all the intelligence which you possess, seek its salient features, look at the points which are clear, allow yourselves to indulge in hypotheses, and, if necessary, go ahead; scrutinise every word in the phrase, strive to understand the unknown tongue, try to stammer it out, and do not delay speaking it till the hundred thousand words of the dictionary are graven on your memory. On the morrow, a new fact will be added to the first; this will suggest new points of comparison, all the more obvious to

you, the better you have studied and understood the original fact. Then you will proceed to the verification of your hypotheses, bringing together some things and separating others—for when two notions confront each other within one intelligent head, the mind must find out what they have in common, and what they possess foreign to each other.

Procceding thus, you will soon be in possession of the Baconian "forest of facts." In the course of your progress, a thousand ideas will germinate in your heads, a thousand hypotheses, a thousand systems, will be constructed and destroyed. You will no longer be the slaves of facts; you will hold them enchained, ready, summoned to respond to your interrogations; they will not thrust an idea upon you, but you will call upon them to verify your ideas; as the submissive slaves of intellect, they will have to obey you, but they will require you to have an understanding with them:—and this is the point at which the numerical method and statistics intervene.

It is better, said Gaubius, to stand still, than to walk on in darkness—"*melius est sistere gradum, quam progredi per tenebras.*" But in what manner has the human mind progressed from the beginning of time? I ask you, if it has not always proceeded to verify an hypothesis after the fashion of the daring navigator who, with prow to the west, trusts to unknown seas his genius, his glory, and the lives of himself and his adventurous comrades? What ideas germinated in the head of Galileo before he discovered the movement of the pendulum! and do you believe that he required to see a thousand candelabra oscillating under the dome of Pisa to enable him to create that splendid hypothesis which soon became part of the domain of science? Toricelli formed an hypothesis; he put mercury and water into tubes, and thus he discovered a law! Lavoisier weighed the peroxide of mercury, and thus was modern chemistry discovered! In one fact, the whole science was revealed to him. How many millions had seen the steam raise the lid of a tea-kettle! Watt saw it once. The fact was fecundated, and the man of genius who invented the steam-engine at once made himself and his country illustrious.

The proposition of Gaubius, adopted by one of the most eminent practitioners of our day, is true, provided its application be restricted to the incredible vagaries of minds unguided by a single fact. It is obvious that, if we proceed, without either premises or induction, to create a system which, sooner or later, we shall be

asked to submit to the test of experiment, we do what is useless and absurd; but the proposition of Gaubius ceases to be true, and it especially ceases to be scientific, if we possess any facts, however few in number they may be, and however insufficient as materials for systematisation, to guide our first steps amid the darkness. These facts bear a certain analogy to the thread of Theseus and the blind man's staff; and though, assuredly, if we have no other aid, we are walking in darkness and running towards the unknown, we are, nevertheless, not without a guide; and even if we find the road shut up, we shall have well merited the gratitude of our successors for showing them that the way was not open, and so sparing them laborious research in a wrong direction. But the oftener we accomplish something better than this, we put up sign-posts in unknown defiles.

I maintain, then, that it is *better to walk in darkness than to stand still*, if by darkness you mean primary facts and mental processes which precede secondary facts. Why should God have given us minds unceasingly yearning towards progress and always devouring the future? Why has he given us intellects ever active, eager to compare, to form conclusions, to abstract, and to systematise, were it not that the intellectual faculties might be constantly at work with the primitive materials called facts? And are not the products of this mental work, ideas, inductions, hypotheses, and systems, to be tested by the numerical method and statistics?

I hear you ask me:—Why begin with induction and systematisation, if you have ultimately to come to a matter of accountancy with facts and of facts? It is very easy for you to say to me:—Shut the eyes of your understanding; here is an object which presents itself with colour, form, weight, and density; state its *modalities*, but I prohibit you from forming a *concrete*. Is it possible for me to refuse an attribute to the subject, to disjoin violently what my mind has strongly united and combined? Can I see, hear, and feel, without judging—judge without forming conclusions—form conclusions without systematising? What is it you wish? Shall I make a repertorium of ideas? Shall I bridle my understanding, and wait for the signal to start on my intellectual race? You say, "Off!" But, I ask, how am I to equip myself for the course? Do you suppose that the rust of inactivity can be rubbed off at your word of command? You wish the pupil to see only crude facts, and to stifle his intellect: and when, by means

of this dismal labour, his mind has been to some extent mutilated, you will ask him to show mental vigour, and will dare to hope for his manifesting prolific thought.

We must allow the luxuriant intellect of youth to grow up in freedom. We must take care not to stop the flow of that generous sap which seeks to spread forth only in blossom and branches; so long as the vital juice is drawn from a soil fertile in clinical observation you need not fear that the growth will stretch too far. The members of the Faculty whose duty it is to guide pupils in their practical studies will moderate their impetuous ardour. They also have some accounts to settle with hypotheses; but they have attained an age which has whitened their hair and ripened their experience, and, having become accomplished practitioners, they place at your service, for your instruction, their disappointments, their knowledge, and as much of that which constitutes individuality in their art as it is possible to transmit.

What I have said regarding philosophical methods is only applicable to the science, and in no degree to the art of medicine. In point of fact, methods belong to the sciences; in the arts they neither have, nor ought to have, any existence. Method and art reciprocally exclude each other.

Every science touches art at some points—every art has its scientific side; the worst man of science is he who is never an artist, and the worst artist is he who is never a man of science. In early times, medicine was an art, which took its place at the side of poetry and painting; to-day, they try to make a science of it, placing it beside mathematics, astronomy, and physics.

In my opinion, a science deals with concrete elements or calculable abstracts; it implies the possibility of formulæ, and excludes individuality: an art creates manifestations without having calculated their connection with causes, thus implying the impossibility of formulæ and proclaiming the idea of individuality.

A Newton would be the most stupid of mathematicians if he only occupied himself with the calculus; a painter is a painter, and nothing more than a painter. Scientific results are, we may say, stereotyped; results are not scientific unless they are identical—that is the criterion. Artistic results are essentially various and variable, and the more individuality there is in the artist the more is he an artist. In the sciences there are no schools; in the arts there are as many schools as there are great masters.

In accordance with the definition which I have given of science, provided the inferences which I have drawn from that definition be correct, I shall be allowed to regard medicine as an art; and those, even, who most ardently desire to see it raised to the rank of a science will doubtless admit with me that, up to the present time, it is very little deserving of the honour which they wish to confer on it. It would, no doubt, be very desirable to see all physicians, in a given malady, calculating the causes, the issue, and the treatment, with mathematical precision; it would be beautiful to see all persons entrusted with the sanitary regulations of communities making up annually an exact balance-sheet of their practice, and proudly submitting their inflexible results to the inflexible examination of a court of medical accountants. Unfortunately, such a consummation can never be; we shall always be called upon to lament the deplorable uncertainty of medicine, precisely for this reason, that if science necessarily has principles, art (which even ignores itself, which often goes forward to its object through darkness) can at best only have processes very difficult of transmission. In medicine, do not confound art and science. All cannot become artists; but persons of the most ordinary intelligence can make acquisitions in science; it does not, however, gentlemen, follow that science is useless, or, in the present day, an unnecessary part of the education of the greatest men of art.

We are, therefore, entitled to exact from you evidence of the possession of scientific knowledge, because it is something which can be acquired, and which by industry is acquired by all, in greater or less proportion; but we will never exact more than scientific knowledge, for the rest is a natural gift. Take care not to fancy that you are physicians as soon as you have mastered scientific facts; they only afford to your understandings an opportunity of bringing forth fruit, and of elevating you to the high position of a man of art.

I still recollect the concluding years of my medical studentship. Like many others, I went to a celebrated amphitheatre to study operative medicine; like many others, I was led away by the exactitude of the methods which directed the knife and the lithotome in so invariable a manner; like many others, I made a hobby of the most laborious surgical operations; and when we were drawn by curiosity and the desire for instruction to the Hôtel Dieu or the Charité hospitals, where the masters of the surgical art were about to put in practice the precepts which we knew so well, we often,

with sly satisfaction, detected that the knife was going astray between the rough surfaces of a refractory articulation, or was not held at a sufficient angle to avoid a vessel with certainty; and then we were not far from thinking that our right places were not on the benches among the students. What did it matter, though the operator was the best surgeon who ever amputated at the shoulder-joint, or whether operative medicine was an occupation more difficult than that of the carver! Assuredly, if we could collect and reanimate the ashes of Ambrose Paré, if we could here evoke the most illustrious surgeon of modern times, J. L. Petit, I much fear that these two great men would be found less brilliant operators than many young students proud of possessing so easy a talent!

Gentlemen, most of you know more chemistry than Paracelsus, many of you more than Scheele and Priestley, some of you even more than our Lavoisier. You know chemistry, but still you are not chemists; and among those who now hear me, do you believe that there are many whom posterity will deem worthy of being placed beside the men whose glorious names I have just mentioned? Thus it is, gentlemen, that there is a great difference between the man of science who reaps, and the man of art who produces. Do not, therefore, fancy yourselves physicians because you have acquired the habit of applying to the diagnosis of diseases the ingenious proceedings by which science has become enriched since the beginning of this century. The admirable diagnostic methods—auscultation and percussion—given by Laennec to the public for the general good, and of which no one is allowed to be ignorant, are in our hands what the telescope and the magnifying-glass are in the hands of the astronomer and the naturalist—instruments intermediary between external objects and the mind; but a magnifying-glass will no more make a Tournefort or a Galileo, than a stethoscope will make a Sydenham or a Torti.

And moreover, gentlemen, it is undeniable that the increased means of investigation possessed in the present day, by multiplying elementary facts, or at all events by rendering them more exact, does not fit the mind for producing more prolific, more practical, or more reliable manifestations of art. How, then, does it happen that the mind becomes indolent in proportion to the increase of scientific notions, satisfied to receive and profit by, but caring little to elaborate or originate them? Scientific processes assist art less than is supposed. Chemistry teaches you how to form colours; it has told

you wherefore, and when, they do not blend; it has taught you to fix them upon a canvass less liable to change and better prepared. An illustrious man of science has given you a knowledge of the modifications which shades of colour produce upon each other; in a word, he has made a science of the harmony of colours. And yet, the blood still circulates under the pallet of Rubens, textile fabrics still shine resplendent upon the canvass of Van Dyck, and the Madonnas of Raphael retain all the divinity and sweetness of their beauty. Why, then, with so many ways of study, with so much valuable scientific knowledge at command, have our painters remained so far behind the less scientific masters who constitute the glory of the art? Why, then, do not we, so rich in preparatory knowledge, so rich in means of diagnosis, produce such men as Baillie, Sydenham, Torti, and Stoll? It certainly is not because nature has been more chary of her gifts to us; each century brings forth the same class of minds, and ages the most abjectly barbaric have probably given birth to men of as vigorous intellects as those which produced Pericles, Augustus, Leo X, and Louis XIV. How often in our intercourse with the young men who crowd our benches do we meet with intellects of the highest class, who only require a fitting opportunity and a favorable direction to produce fruit! But some of you who have shown exceptionally great talents, when you have acquired, by long study, perhaps, but without difficulty, a knowledge of the preparatory sciences (to which unfortunately so large a place is accorded in the medical curriculum), when in a few months you have equalled, or, it may be, surpassed your masters in the easy art of applying the senses and the various obtainable instruments to local diagnosis, becoming elated by a conquest which has cost you so little, and strengthened in the good opinion of yourselves by persons who look on medicine as consisting only of the common stock of knowledge, accustom your minds to no efforts of production, and sink down into a sort of moral inertia; while, on the other hand, we see that our predecessors, less rich than we are in available knowledge, ceaselessly laboured to originate: poor they were, but they turned to account the tiny stock of information which chance or experience had given them; they exercised their intellectual powers as constantly as wrestlers exercise their muscles, and the result was power, which sometimes showed itself in singular aberrations, but likewise also in views full of greatness and fertility. The very poverty of means increased the intellectual efforts, and the results were immense; and you, sur-

rounded by a profusion of means, spoiled, enervated, cloyed with the abundance presented to you, know only how to receive and gorge, while your lazy intellects are smothered with obesity, and are sterile.

For mercy's sake, gentlemen, let us have a little less science, and a little more art!

But I said that a man is born the artist, and that he becomes the *savant;* I said that scientific knowledge is easy: well! already I hear persons who either understand me amiss, or think they ought to do so, accuse me of encouraging young men in apathy and fatalism. If, say they, we are born artists, we are likewise born physicians; let us quietly wait for the natural inspirations of art.

I do not allow any one so to misinterpret my words. A man is born an artist in this sense—that if nature has refused you artistic aptitude, do what you like, you will never be *savants;* but, with the most happy aptitudes, you will be nothing without hard work. Hard work is a powerful source of inspiration; contemplation of the masterpieces of art constitutes the education of the artist, and a painter, endowed with the loftiest intelligence, who would not go to pass some years of his life in that atmosphere of genius which is breathed on the other side of the Alps, will never be more than an incomplete man, shut up in his own straitened individuality, whereas with study, with example, he will at once profit by the laborious inventions of artists of past ages now belonging to and easily obtained from science, he will correct the flights of his impetuous imagination, which will be constantly brought back to the beautiful by the contemplation of the beautiful; he will instinctively, involuntarily purify his taste, and all his originality, henceforth properly directed, will throw itself in full force with the greatest ease into the lofty regions of art, and bring forth those wonderful productions which the artist bequeaths to the admiration of future generations.

God made Lavoisier, but our immortal chemist would not have been more than a happy farmer of taxes if he had not, amid the fumes of the furnace, and by frequenting the society of the scientific men of his day, educated that intellect which was destined to give birth to the most prolific of chemical discoveries.

Do you suppose that Paré, J. L. Petit, Sabatier, and Dupuytren—do you suppose that Baillou, Fernel, Laennec, and Corvisart—do you suppose that Lavoisier, Fourcroy, Berthollet, and Dumas—do you suppose that they, and many others whose names are in the

mouth of every one of you, could by the powerful gifts which nature bestowed on them have become princes of their art unless they had cultivated their natural powers at an early stage of their career, unless they had in early life greedily devoured the treasures of science which were spread out around them as they are spread out around you—unless, though wearied by, they had never been satiated with labour, and had believed that they had no right to reserve for their own use the riches which they had acquired, the discoveries by which they made themselves illustrious, and had been jealous to see their country, already foremost in literary renown, become foremost also in scientific glory?

May this, gentlemen, be your noble heritage. But to secure it toilsome exertions are required. Whilst you are young, and while you make your first essay in arms, let your fields be the hospitals and the clinics; when your knowledge has increased, let the hospitals and clinics still be your fields; and let the hospitals and clinics continue to be your fields of industry after you have acquired all the scientific knowledge which we exact from you at the probationary examinations. By pursuing this plan, you will attain expertness in the practice of your art, knowing what science teaches, and having the power within yourselves of originating; then, also, will you begin that priesthood which will honour you, and to which you will do honour; then, too, will commence the life of sacrifice, in which your days and nights will be the patrimony of your patients. You must resign yourselves to sow in devotion that which you must often reap in ingratitude; you must renounce the sweet pleasures of the family, and that repose so grateful after the fatigue of laborious occupations; you must know how to confront loathsomeness, mortifications of spirit, and dangers; you must not retreat before the menaces of death, for death achieved amid the perils of your profession will cause your names to be pronounced with respect.

MEDICAL CLINIC OF THE HÔTEL-DIEU OF PARIS.

LECTURE I.

SMALL-POX.

GENTLEMEN,—Since the great discovery of Jenner, small-pox seems to have occupied a much less important place in medicine. It was even hoped in the early days of vaccination that a means had been found to destroy the worst scourge which ever decimated the human race; but ere twenty-five or thirty years had passed away, in spite of the practice of vaccination, epidemics of small-pox reappeared, and did not always spare the vaccinated. In giving the history of cow-pox, I propose to tell how it has lost some of its original properties, to study the plan by which it may, perhaps, be possible to restore to the vaccine virus that which it has lost, and likewise to state the methods by which vaccination may henceforth be made as efficacious as possible.

Cases of small-pox are at present so common that a week does not pass without our seeing patients afflicted with this disease in our wards; whereas, thirty years ago, in the same wards, they were exceedingly rare, and only met with in persons who had not been vaccinated. Is not one entitled to ask, whether this change does not depend upon the medical constitution through which we have been passing for a certain number of years, and which might have been otherwise more troublesome had it not been rendered milder by cow-pox? Although epidemics of small-pox do not spare even those who have been vaccinated, it must be owned that they spare most of them; again, in most of the vaccinated, the disease has generally been modified in its form and symptoms, so that vaccination, though it has not in our day its original efficacy, still retains a degree of efficacy which cannot be disputed.

Nevertheless, although antecedent vaccination generally modifies the disease, small-pox is a terrible calamity when it scourges even vaccinated communities, but it is the most severe of all epidemic diseases when it attacks the unvaccinated. Perhaps some of you have read the account of the epidemic of small-pox which ravaged the aboriginal Indian tribes of Canada some years ago; nearly twenty-two thousand persons were attacked, and in from five to six months almost the entire population was carried off by this frightful fever. At the close of last century, in proportion as the navigators penetrated into the isles of the Pacific Ocean, small-pox, which the men of the old continent brought with them, burst forth with fury among the inhabitants of the newly discovered world, and the mortality assumed a frightful magnitude.

It appears, then, that the study of small-pox is a matter of great importance, and this importance will probably increase more and more in consequence of the neglect of the practice of re-vaccination, which, though as commendable as it ever was, is rejected by many physicians, and is not universally accepted by the public.

For fifty years, the study of small-pox had come to be looked on as of secondary importance in medical education. It has now become necessary to return to it and insist upon it; I also propose, therefore, to sketch the principal features of the disease. Though I have acquired a sad experience in small-pox, I have learned almost nothing regarding it which has not been much better observed and described before me. I shall, therefore, take Sydenham as my guide. Some of you have in your hands extracts from his writings, which I have arranged in the form of aphorisms in a pamphlet of a few pages, containing the most important statements made on this subject by the English Hippocrates. I now propose to paraphrase this little book, and to add to it some critical remarks; I will sometimes appeal from the writings of Sydenham to the clinical studies which we pursue together in the hospital, and, without changing much of what that illustrious man has said, I hope to teach you everything which it is essential to know regarding this exanthematous pyrexia.

Small-pox differs from scarlatina in this respect, that it always shows itself to the eye. During the first few days, during the period of invasion, one may not have suspected it, but as soon as the eruption appears there is no longer any scope for hesitation. Its manifestations are unmistakably characteristic, and it ought

not to be possible to confound variola even with varicella, an essentially different disease, though the two are sometimes confounded with each other.

Small-pox is subject to modification in respect of the eruption, and the course which the disease runs. This modification, or new phase, is the consequence of antecedent small-pox or cow-pox. It is an error, as I shall afterwards explain, to apply the term *varioloïd* to modified small-pox. Under all circumstances, whether modified or unmodified, small-pox appears under two principal forms, viz., the *distinct* and *confluent;* and whichever form it assumes, the symptoms are either normal or abnormal.

It is not a matter of indifference to establish the varieties of the disease, and it is quite essential to recognise its two principal forms; for distinct small-pox is generally free from danger, while confluent small-pox is one of the most terrible of diseases, almost always proving fatal to those whom it attacks. The course and termination of the two are so different, and the phenomena which characterise them so decisively distinctive, that it is of the utmost importance, following Sydenham's example, to describe and study each separately.

DISTINCT SMALL-POX.—*Constipation.—Convulsions.—Rachialgia.—Paraplegia of Small-pox.—Duration of the Period of Invasion.—Eruption considered with reference to its position on the Face, Trunk, and Limbs.—Orchitis of Small-pox.—Desiccation.*

In every case of small-pox, the clinical observer can recognise a period of incubation, and four other periods, viz., those of invasion, eruption, maturation (or suppuration), and desiccation.

The period of incubation has a duration the extent of which has been established by observation in cases of ordinary contagion, and demonstrated by experiment for more than half a century in Europe, by the inoculation of natural small-pox. Attentive observers, then, have satisfied themselves in a precise manner as to the number of days which elapse between inoculation and the manifestation of the disease; they have ascertained that, except in extraordinary and exceptional cases, the period of incubation extends to between eight and eleven days.

The period of invasion, in distinct small-pox, is characterised by a violent rigor, or sometimes by many rigors, interrupted by accessions

of burning heat; and these phenomena are always more decided in this disease than in any of the other exanthematous pyrexiæ. The skin continues relaxed up to the eighth day, and, in the adult, sweating is an essential symptom; in children it is otherwise. The perspiration, which appears with the first access of fever, is checked by nothing, and continues, even when the patients are lightly covered, up to the period of maturation; it then goes on, even when the fever has subsided, and after the completion of the eruptive process: it seems to constitute a favorable crisis on the part of the skin, coming in aid, as a sort of emunctory discharge, to the great cutaneous eruptive manifestation. I must here remark, that in confluent small-pox this tendency to diaphoresis is generally absent.

In distinct small-pox, the period of invasion is also characterised by vomiting, or a desire to vomit; this symptom is very seldom absent. A more important symptom, still more rarely wanting in adults, is constipation:—it persists during the entire course of the disease, or at least the bowels are relieved with difficulty. It must be mentioned, however, that in some epidemics diarrhœa has been observed in adults.[1]

Diarrhœa in children, on the other hand, is the rule and not the exception. Besides this complication, there are others met with in children, to which it is still more important to call attention. In the first place, there is a tendency to sleep; and still more frequently, even in those who have cut their teeth, convulsions occur. They more frequently occur in children in the earliest stage of small-pox than at the corresponding epoch in cases of measles or scarlatina. So well aware was Sydenham of the frequency of this symptom, that when he met with convulsions in a child whose dentition was completed, he at once suspected that he had to do with a case of incipient small-pox; he did not consider convulsions ushering in an attack of small-pox as at all a serious complication. This proposition, however, if applied generally, requires to be stated in a less

[1] Diarrhœa in the adult.—"In quadam constitutione epidemica variolas observavit Carolus Richa, quæ cum alvi fluxu incipiebant, et eundem ad finem usque comitem habebant, bono cum eventu, sive id a saburra primarum complicata eveniret, sive a materiæ variolosæ portione, quæ hac via excerneretur. *Consil. epid. Taurin., anno* 1720, § xv.)—Vogelius, etiam, diarrhœam salutarem ab initio ad undecimum usque diem vidit, lethalem vero eam quæ postea supervenerit."—Note of Borsieri, p. 150.

absolute form:—if a child, for example, has one or two convulsive seizures shortly before the appearance of the eruption, it is not in great danger, but there is more risk when the convulsions occur early and recur frequently. For my own part, however—but my experience of small-pox in children has been small—I should say that the occurrence of convulsions is a troublesome complication rather than a favorable symptom. It must be borne in mind, too, that (as Borsieri has remarked) convulsions may constitute a misleading as well as a serious symptom, inasmuch as they sometimes carry off the patients before the appearance of the eruption.

Simultaneously with the shivering and sweating, the burning fever and the vomiting, another important symptom supervenes —this is pain in the lumbar region (*rachialgia*)—it is hardly ever absent, and in no other pyrexia, excepting yellow fever, is it so severe. It is not, as has been supposed, a muscular pain, but is dependent upon an affection of the spinal marrow. Here is the proof. In a great many cases (and last year within a few days I could have shown you two examples) the lumbar pain is accompanied by paraplegia. Without your putting any leading questions, the patients themselves mention this paralysis: they complain of painful numbness in, and inability to move, the lower extremities. When you inquire whether the upper extremities are similarly affected, you discover that their motor power is in no degree impaired. The paralysis sometimes affects the bladder, as is evidenced by retention of urine, or at least by great dysuria.

The paralytic symptoms are generally of short duration, but in some cases they continue till the ninth or tenth day; generally, they cease spontaneously when the eruption appears. There are, however, some cases in which the paralysis persists not only during the whole course of the disease, but likewise constitutes one of the complications of convalescence.

When the lumbar pains are not very acute, the patient only experiences lassitude and dull pains (like those of rheumatism) in all the limbs, with occasionally pain, increased by pressure, at the pit of the stomach. "*Doloris sensus in partibus quæ scrobiculo cordis subjacent, si manu premantur,*" says Sydenham.

To sum up:—the period of invasion is characterised by rigors, ardent fever, and constant sweating, by nausea and constipation, by disturbance of the nervous system, such as convulsions in children; by general, but particularly by lumbar pains, with which are fre-

quently associated paralysis of the inferior extremities, and occasionally paralysis of the bladder.

I must, nevertheless, remark that in some exceedingly rare cases mentioned by old authors, small-pox proved so mild that the eruption made its appearance without having been preceded by any febrile disturbance; the outbreak of the pustules was either the sole manifestation of the disease, or, if there was any fever, it was so slight as to have passed unnoticed. In such cases, as Borsieri has remarked, there is no appreciable period of invasion.

In distinct small-pox the period of invasion is usually three complete days; rarely three days and a half; still more rarely four days; and almost never only two days. This duration is so generally the rule, that when one sees, after the inoculation of natural small-pox, the fever of invasion set in with a certain amount of vehemence, and three times twenty-four hours elapse before the eruption is developed, it may be prognosticated with certainty that the attack will not be severe. The fact is, that *the longer the eruption is in appearing, the less serious will the disease prove; and the less delay there is in its appearance, the more dangerous will the disease prove.* When the eruption appears at the end of the second day, it is certain to be confluent; if on the third, it is almost always confluent. If, on the other hand, the eruption does not appear till the fourth day, still more, if it be delayed till the fifth or sixth (as in a case observed by Violante), or till the fourteenth (as in a young girl whose case is recorded by Haen), it is necessarily distinct.

Sydenham, nevertheless, informs us that in some exceptional cases, in consequence of great organic lesions, *ob atrocius aliquod symptoma,* the eruption may be retarded till the sixth or seventh day both in distinct and confluent cases. But under such circumstances, there exist, in addition to the ordinary symptoms of the period of invasion, others depending upon the profound disturbance of the economy and the danger which lies concealed in the affection of an internal organ. In support of the observation of Sydenham, let us recall the circumstances of a case which we had in 1862 in the St. Bernard Ward, bed 27. The patient was a woman of 30, in whom the eruption did not appear till the fifth day; at the commencement of her attack of small-pox, she had had all the symptoms of sporadic cholera, such as vomiting, purging, cramps, general coldness, blanching of the mucous membranes, dry cold tongue, injection of the conjunctiva, and a dull appearance of the cornea. The

choleraic symptoms ceased on the fourth day, and on the fifth the eruption of small-pox appeared.

At the commencement of the second period, that is, as soon as the eruption appears, the fever subsides, and the other symptoms cease, except, as has already been stated, the tendency to perspire, which continues till the maturation of the pustules. Recollect that I am now speaking exclusively of distinct small-pox; in the confluent form the symptoms in question do not cease with the appearance of the eruption.

I ought here to remark that modern scientific precision has confirmed the observation of the old clinical observers. The thermometrical researches of Wunderlich and his scientific emulators show that when the eruption appears, and when the pulse is found to diminish in frequency, the other phenomena characteristic of fever disappear; there is simultaneously a notable fall in the general temperature, which gradually returns to its normal standard, which, as you know, is 37 degrees in the axilla.

Here are the leading facts in relation to the progressive change of temperature in the distinct form:—At the commencement of the disease the temperature rises very quickly, and remains as high for a considerable time as from 40° 5″ to 41° 5″, that is to say, that the temperature of the body rises from three to four and a half degrees above the temperature in health, which is an enormous increase. From the time of the appearance of the eruption the fall of temperature is so rapid that in about thirty-six hours it has gone down to below thirty-eight, or, in other words, has become normal. This diminution, though gradual, is not continuous, for while there is a fall of one degree in the morning, there is a rise of half a degree in the evening. It appears, however, that from the time of the disease becoming external, so to speak, the central temperature falls, and there is a complete remission in the general symptoms. The Germans apply the term *defervescence* to the return of the body to its natural temperature.

We shall afterwards attend to the thermometrical phenomena which are seen when every pustule has become a centre of suppuration. I now return to the description of the eruption.

The Eruption.—The eruption first shows itself on the face and neck; but, according to Swieten and Borsieri, it appears also at the same time upon the scalp, a fact which can be most easily verified in persons who are bald; it then comes out a little upon the upper

part of the chest; soon afterwards it takes possession of the arms and hands, and later of the trunk, that is, of the lower part of the chest and of the abdomen, in which latter situation the pustules are very few in number, and sometimes altogether wanting; last of all, the eruption invades the legs.

The successive order in the appearance of the pustules is not so regular as authors describe it to be. If the eruption appears to commence on the face, it is because it is best seen there. When I have uncovered patients, I have seldom found pustules on the face without finding them in quite as advanced a state on the trunk and limbs. From the commencement, also, of the eruptive period, the patients complain of pain in the throat, which depends upon the existence of pustules on the mucous membrane of the pharynx and mouth.

In very rare cases, some of which have been described by authors and some of which I have seen, the only symptoms characteristic of the disease were a few pustules on the pharynx and pendulous veil of the palate.

The skin, to which one naturally ought first to look, is, at the commencement, studded with spots resembling exceedingly fine pricks made with a needle, and still more with papulæ, such as are met with in persons affected by lichen or prurigo; these small specks, which are red, slightly pointed, and hardly above the surface of the skin, are disseminated over the face, neck, and upper part of the chest. Next day, they are more prominent, and from the sixth day of the disease, which is the third of the eruption, the vesicular papules begin to contain a milk-like fluid; next day they increase very perceptibly, their elevation is great, and the fluid which they contain becomes a little more opaque. On the eighth day they have become much larger still, and their opacity is also more decided.

After the eighth day, it is very important to consider small-pox in relation to the eruption as seen on the different parts of the body, because it takes very different forms, according to the parts affected. On examining the face, neck, trunk, and upper part of the limbs, we perceive a sort of gradation, which enables us, however, to recognise the eruption as essentially the same in these various situations: nevertheless, on comparing the papules on the hands with those on the face, the differences between the appearances of the two strike one as being considerable.

On the face, as I have already said, the eruption, on the first day it is *visible,* presents the appearance of small, red, slightly acuminated papules, which next day become more elevated, and on the third day (which is the sixth of the disease) are filled with an opaque, but as yet non-purulent fluid. They go on increasing in size: they generally vary in size, and do not all resemble one another: some are small and some are large, but none attain a magnitude equal to that seen on other parts of the body; and, whatever be their size, they all pass through the same stages. On the seventh day of the disease, they still further augment in volume; and upon the circumference of the base of each papule a redness begins to be perceptible. On the eighth day, this coloration becomes bright, and the more bright and rosy it is, so much the more may the disease be regarded as normal. The eruption now consists of small abscesses — of *pustules:* the pustules become painful, and swelling begins. This is the starting-point of the third period—the period of maturation and suppuration.

The swelling attains its maximum on the following day, that is, on the ninth day of the disease; it decreases on the tenth, and by the eleventh day has disappeared. The tumefaction, which is always great in proportion to the abundance of the eruption, is apparently, but not really greater, in the distinct than in the confluent form; it is specially conspicuous in certain situations, particularly upon the eyelids, which swell out in a remarkable manner, from the laxity of their cellular tissue. When even there are only three or four pustules upon the eyelids, they become so swollen, that Sydenham compared them to puffed out bladders—*vesicam inflatam non malè refert;* and on the ninth and tenth days they prevent the patient from opening his eyes. It sometimes happens, as in a case which we saw in the clinical wards, that pustules occur on the ocular conjunctiva.

The swelling is sometimes quite as conspicuous in other regions as on the eyelids. Van Swieten, for example, saw a single pustule on the prepuce of a child produce a phimosis, which occasioned difficulty in passing the urine. And here, gentlemen, let me recall the fact to your recollection, that the cellular tissue of the prepuce is of exactly the same nature as that of the eyelids. In confluent small-pox, to which we shall afterwards return, the swelling of the face being more general, the tumefaction of the eyelids has the

appearance of being less than it really is, and less than in that form of the disease which we are now studying.

At the beginning of the period of maturation, the progress of the pustules on the face is special. Up to the eighth day, they are velvety and soft to the touch—*leves ad tactum,* to use Sydenham's expression; but after that day, upon passing the hand over the nose and cheeks, they are felt to be rough—*asperiores, ad tactum rudiores;* and this roughness depends upon a slight oozing from the surface of the pustule of a yellowish matter like thick honey. This exudation only takes place from the pustules on the face, where they dry up immediately, the desiccation being complete on the eleventh day.

The pustules on the trunk and extremities have a more regular form, and present more similarity to each other; while those on the face are not navel-shaped, those on the body begin to flatten on the eighth day, and sometimes to exhibit in their centres a small greyish depression called the umbilication. It must not, however, be supposed that the formation of this umbilication is a necessary occurrence. Upon the arm of patients affected with true small-pox, I lately circumscribed a certain number of pustules, and it was found that in only two or three of them did umbilication occur. Do not suppose, then, that the undergoing this change of form is a special character of the small-pox pustule; you will find this very same umbilication occurring in the simple pustules of ecthyma, particularly in the ecthyma produced by friction with tartar emetic. And let me here remark, as a circumstance noteworthy in connection with this point, though not otherwise of any importance, that some physicians of the last century regarded it as an inauspicious sign when pustules were observed, which, though somewhat prominent, were not acuminated, but, on the contrary, bore a small central depression—*in apice faveolam impressam gerunt.*

About the eleventh day, the pustules are filled with a purulent fluid: from that time may be noticed upon the upper part of the limbs, and particularly on the knees and elbows, a drying up of some of the smallest, but without any exudation similar to that seen to proceed from face pustules: between the fourteenth and seventeenth days, as a general rule, desiccation is completed.

On the hands, the appearances presented are different from those hitherto described. From the eighth to the eleventh day, the pustules resemble those on the body, if it be not that the inflammation of the base commences later; but towards the close of the ninth

day, the hands continue to be a little painful; on the tenth they swell, and, concurrently with the tumefaction of the hands, œdematous swelling of the fore-arm is observed, which extends to the elbow, and is very painful. This condition is seldom of equal intensity on both sides, a fact which I am unable to explain. Perhaps it may depend upon the crop of pustules being a little more decided on one side than on the other, or upon the patient resting more on one side, and the swelling being greatest where the impediment to the venous circulation is greatest. If the eruption has been, I do not say confluent, but somewhat abundant, the patient is unable to close his hands from the tumefaction of the skin. The existence of this œdemato-phlegmonous swelling is shown in a very simple manner. It is sufficient to press more or less gently upon the skin between the pustules to leave the mark of the finger; this swelling and pain, which never set in before the eleventh, continue till the fourteenth day. Similar phenomena occur in the feet, as in the hands, when the eruption is copious upon them.

While the pustules have generally acquired their greatest size upon the trunk about the eleventh day of the disease, they continue to increase in volume till about the fourteenth day upon the hands, feet, fore-arms, and lower part of the legs; the œdemato-phlegmonous swelling by which they are surrounded then goes down, leaving them without umbilication, and presenting the exact appearance of beautiful, perfectly round drops of virgin wax. They are, in fact, thickish phlyctænæ filled with pus.

Generally speaking, the pustules of the trunk and limbs burst, instead of desiccating—*disruptione abitum sibi parant;* the pus which they contain escapes, and soils the sheets and body-linen of the patient. The rupture takes place in three or four days; but on the hands, feet, fore-arms, and lower part of the legs, they remain unbroken until the eighteenth, nineteenth, twentieth, or even twenty-second day, an example of which latter occurrence I had an opportunity of showing you. Sydenham, then, was mistaken when he wrote that their duration is not more than one or two days longer than that of the pustules on the body—*diei unius aut alterius mora illas vincunt.* I have, however, gentlemen, pointed out to you at the bed of the patient, that if the pustules on the back of the hand and on the fore-arm present the characteristics with which I have just made you acquainted as occurring on the dorsal aspect of the fingers and toes, they cornify and desiccate without suppuration,

exactly like the pustules of modified small-pox, or like those of the knees and elbows of the unmodified disease.

Before leaving this subject I must remark that it is in the most vascular parts of the skin that the eruption is most copious; and, as was pointed out long ago by observers, the situations in which the pustules are most numerous are the face, the extremities, the circumference of small wounds (such, for example, as those made by the cautery), or the vicinity of blisters. Let me recall to your recollection, as a case in point, the patient who occupied bed No. 9 of St. Agnes's Ward, a lad in whom the eruption was very abundant on the posterior aspect of the fore-arms; he was a cook, and in that capacity constantly had these parts exposed to the heat of kitchen-stoves.

At the commencement of the period of maturation or suppuration, there is a new manifestation, viz., the *fever of maturation*. The serious symptoms present at the beginning of the disease had so entirely disappeared with the coming out of the eruption, that the patient had regained his cheerfulness and appetite; but they return on the eighth day, and constitute the fever of maturation.

Here, again, investigation with the aid of the thermometer gives valuable information. We have seen that on the fourth day of the disease, at the date of the appearance of the eruption, and also whilst it continues, there is a fall in the temperature of the body and a truce to the fever, the entire morbid effort being concentrated, so to speak, in the skin, but the temperature does not remain for more than a day or two, or for three days at the most, at the normal standard of 37°; it rises a little during the period of suppuration, but does not become so high as it was during the initial fever. In severe cases, however, the fever which attends suppuration is more intense, and the temperature may even rise as high as it was before the eruption appeared. To be more precise:—in slight cases, within three days, the temperature rises to about 38°·5, while in the more severe cases it may rapidly ascend to 40°·6, and even to 41°·2. This great elevation of temperature, however, is most frequently observed in the confluent form of the disease, of which I shall immediately have to speak to you. In the mean time, to sum up what has now been stated, I may say that the central temperature rises anew about the seventh or eighth day of the disease.

The fever of maturation lasts for three days; on and after the eleventh day of the disease the patient is free from it, provided the

case is of the distinct form. The temperature becomes again the exact index of the progress of the fever; thus, after having risen to at least 38°·7 in the fever of maturation, it falls progressively in three days to the normal standard. If the fever continue longer, it depends on complications, which, as I have already said, are rare in the distinct form of the disease.

Orchitis, and *ovaritis*, its analogue in the female, next claim our attention as phenomena which sometimes occur concurrently with the appearance of the eruption. M. Béraud, an hospital surgeon, has in recent years treated the subject in a very complete manner.[1] We must not restrict the terms *orchitis* and *ovaritis* to inflammation of the parenchyma of the testicle or ovary, but extend it to inflammation of the tunica vaginalis, and the folds of peritoneum which surround the ovaries. The inflammation of the serous membrane is the result of the small-pox eruption affecting them as it does the skin, although of course the appearances presented in the two situations have very different characters, just as herpes on a mucous surface is very different from herpes on the skin. Small-pox manifests itself upon other serous membranes than those now named. Long ago, Van Swieten and Hoffmann had called attention to variolous meningitis; Fernel, Werlhoff, and Violante have mentioned variolous affections of the lungs and intestines twenty-seven years ago; Pedzholdt published the observations he made on variolous meningitis and peritonitis, in the epidemic which prevailed at Leipsic during the winter of 1832 and 1833. Variolous orchitis is detected by the patient complaining of pain when the slightest pressure is made on the scrotum, or when he moves; forthwith, swelling of the parts is perceived, and subsequently fluctuation; the pain is less acute when the inflammation occupies the parenchyma of the organ. The symptoms of ovaritis are not so well marked, and are less known.

The facts recorded by Béraud have been regarded as exceptional. Till he wrote, neither my attention nor the attention of any one had been specially fixed upon this subject; but his work had scarcely been published when, within a week, I showed you two cases of variolous orchitis in my wards. Since that time, we have had very many similar cases, not because they are more common now than in Sydenham's time, but because we now look out for the affection,

[1] Béraud:—Archives Générales de Médecine, Mars et Mai, 1859.

and have learned how to detect its presence. In the same category we must include diphtheritic paralysis and rheumatismal disease of the heart, affections which, though not more common, have recently been better observed.

From all I have now said, gentlemen, respecting the rise and fall of the temperature of the body in small-pox, it follows that the thermal line drawn for this disease is a material and striking representation of the singular course of the fever. Indeed, there is nothing more characteristic than the curve in the line which indicates the rise and fall of temperature in small-pox. There is, first of all, the rapid rise at the beginning of the attack, then the continuance of the high temperature for two or three days, that is, during the initial fever; secondly, there is a gradual diminution in heat during the two days which correspond to the period of eruption; thirdly, a fresh rise of temperature (more moderate than is seen at the beginning), corresponding to the fever of suppuration; while, fourthly and lastly, the diagram indicates a return to the normal temperature, marking the period of desiccation to have been reached.

Period of Desiccation.—Let us now study this fourth period, and consider how cicatrisation is accomplished.

Upon the face and body, crusts are formed, which fall off; upon the hands, the abraded epidermis leaves in its place a small red surface, exactly like that left by the pustule of ecthyma. Upon the fall of the crusts—which takes place from the face-pustules about the fifteenth, eighteenth, or twentieth day, and a little later from the body-pustules—there remains in their stead, not a depression, but a projection of a violet-red hue, deep in shade as in the skin of individuals who have been exposed to cold. On this projection a small scale of epidermis forms, which separates in a few days, and is succeeded by a thinner scale, which in turn gives place to another thinner still, and thus, in succession, epidermic scales form and fall during a period of from ten to thirty days. By degrees the projection diminishes; after from four to six weeks there is seen in its place a slight depression; in four, five, or six months, the redness of the skin has disappeared, leaving only the small whitish puckered cicatrix familiar to all of you. It must, however, be recollected that when the disease has been of the distinct form, and when the pustules on the face have not been very large, the red marks generally disappear without leaving more than a slight and transitory unevenness of

surface; but there are other cases in which, notwithstanding the absolutely "distinct" character of the pustules, deep cicatrices are left.

Such is the normal course of the distinct form of small-pox; it is not a fatal disease.

Distinct small-pox, however, though apparently strictly normal, may sometimes, though very rarely, terminate in a manner totally unlooked for, as so often happens in scarlatina. Recall to your recollection a young woman of twenty-one who lay in bed No. 7 of St. Bernard's Ward. She had passed through a remarkably mild attack of distinct small-pox. The sister of the ward had left her at eight o'clock in the evening in a perfectly satisfactory state. Soon afterwards she was seized with cerebral symptoms, and difficulty in breathing; in an hour she was dead. It is a curious, anomalous fact, that when distinct small-pox does prove fatal, death occurs earlier than in the confluent. Sydenham observed, and so have I in many cases, that when death occurs in distinct small-pox, it happens about the eighth or ninth day, but not till the eleventh or thirteenth in the confluent.

The illustrious physician whom I have just named, Sydenham, and after him Van Swieten and Borsieri, observed anomalous and malignant epidemics of distinct small-pox. They were characterised in the prodromous period by the severity of the pain in the head and back, great prostration of strength, anxiety, agitation, stupor, and sometimes by delirium. The want of appetite, amounting to disgust for every kind of food, was very marked. Sometimes there was delirium and sleeplessness; at other times, profound coma, twitchings of the tendons, a tendency to syncope, and very often, irregular, quick, and laborious breathing—the latter, an indication of great danger. The fever was at times very high, and at other times the pulse was small, feeble, and irregular; there was not much heat of skin; the perspiration was very copious. The eruption came out well on the third or fourth day, but there was more than one crop: on the fifth or sixth day fresh pimples appeared; all the pustules did not attain the same size, some remaining pale and indolent, while in cases where the eruption was mild, pressure on a level with the pustules occasioned acute pain. The fever and other disturbances of the system continued, in place of subsiding on the appearance of the eruption, as in ordinary cases. Inordinate perspiration stopped suddenly, and could not be recalled in any degree by treatment. Micturition was frequent, but scanty, and sometimes

there was suppression of urine, a symptom which Sydenham regarded as of most unfavorable augury at that stage of the disease, as well as in the decline of the distinct form. Occasionally, copious diarrrhœa set in. At last, the patient sunk, as I have already said, on the eighth or ninth day, under the nervous and comatose symptoms of which I have spoken.

From the facts now stated, it appears that when the eruption does not come well out by the fifth, sixth, or seventh day—when the pustules are irregularly developed; when the perspiration ceases, and cannot be restored; and, lastly, when delirium, profound coma, and twitchings of the tendons continue or supervene, the worst possible prognosis must be formed. The fatal issue is impending and very near. Delirium, however, must not be confounded with acute mania, of which we had a case in a woman, who, during the progress of modified small-pox, presented no disturbance of the nervous system, except attacks of mania without fever. At the beginning of the fever of maturation, on the sixth or seventh day of the disease, it is not unusual, even in distinct small-pox, to meet with delirium, lasting for one or two days; it is most frequently observed at night; sometimes it is rather violent. At one time I used to be much alarmed by the occurrence of delirium; but at present it is a symptom which gives me no anxiety. It subsides without the intervention of art, and modifies neither the general character nor the prognosis in distinct small-pox. Here I must, however, make certain reservations. I do not fear delirium if the pulse maintain its volume and do not become rapid, if sweating continues; but if the skin is dry and cold—if the pulse lose its proper strength and become small, sharp, or irregular, the delirium has a very different meaning, and is a certain sign of approaching death.

CONFLUENT SMALL-POX.—*Diarrhœa* (*chiefly in children*) *at the commencement of the illness.—Salivation.—Swelling of the Face.—Swelling of the Hands and Nervous complications.—Boils.—Abscesses.—Purulent Infection.—Albuminuria.—Anasarca.—Treatment.*

When the fever of invasion is exceedingly intense—when the initial shivering has been greatly prolonged, the pain in the loins

acute, the paralysis of the lower extremities and bladder very decided, the vomiting continuous—when sometimes, even in adults, the cerebral disturbance has been great—and, finally, when the perspiration has not been abundant—when such circumstances arise—it may be concluded that the case is to be confluent. But there is another sign, independent of the symptoms now enumerated, by which we may confidently predict the same result, when the disease is normal; and that is, the appearance of the eruption at the end of the second day, or not later than during the third day. In normal distinct small-pox, as I have already said, the eruption is generally delayed till the fourth, or even till the fifth day. These remarks, however, are only applicable to the normal course of the two forms of the disease, for in some bad cases, *malo semper omine*, as Sydenham and Borsieri observe, the eruption does not come out till the fifth, sixth, or seventh day, or even later.

Diarrhœa is very often observed in confluent small-pox from the commencement of the illness, both in adults and children, but particularly in the latter; whereas, in distinct small-pox, as I have already mentioned, constipation is the rule, at least in adults. This diarrhœa, which is most common in children, continues not only to the fourth and fifth day of the disease—the second and third of the eruption—but even to the ninth and tenth; and in young subjects it takes the place of salivation, which in adults is a leading feature of the confluent form. While in the distinct form, on the appearance of the eruption, the fever ceases, or at least diminishes to such an extent that the patient is free from discomfort and seems restored to health, it does not at all abate in the confluent form, when the eruption comes out; on the contrary, it goes on, and even increases, up to the eighth day, and, indeed, sometimes up to even the thirteenth day. Here you no longer find the period of initial fever from the first to the fourth day, and the period of maturation fever from the eighth to the tenth day. The fever is continuous from the beginning of the illness to the end of the second week, or often to a later date. There is a reduction of heat for not more than twenty-four hours, to the extent of one degree. During the suppuration of the pustules, the temperature may rise to, or even exceed, forty-one degrees.

The confluent is still further characterised by three great phenomena not seen in the distinct form. I have already alluded to salivation. I now add great tumefaction of the face and swelling of

the hands and feet. The two last-mentioned symptoms do not exist in distinct small-pox, or at least if they are present when the eruption is rather abundant on the extremities, it is in an insignificant degree as compared with what is met with in the confluent form. Salivation is almost never seen in distinct small-pox.

Let us now attend to the characteristic features of the eruption in confluent small-pox.

On the first day of the eruption—the end of the second or beginning of the third day of the disease—a redness appears on the face, which, unless it be closely examined, has a diffuse aspect. This redness is so great on the following day, that it is often impossible to know whether the eruption be that of small-pox or measles. This is a point on which Sydenham lays great stress, remarking, in reference to external appearances, that the eruption of confluent small-pox coming out, *nunc erysipelatis ritu, nunc morbillorum*, it is very difficult for those who have not had great experience in the two diseases to avoid confounding them, unless attention be paid to the general phenomena of the case; though with this precaution it is impossible to mistake the one for the other.

It is not till the third day of the disease that notable projections are visible on the countenance. The diffuse patches of redness, which at an earlier stage might have been mistaken for measles, have now become papules, some of which already contain a little milky fluid. On the face the papules have hardly any space between them, so that when the hand is drawn across the forehead or cheek of the patient, the inequalities on the surface of the skin can scarcely be detected. The papules, besides being smaller than in distinct small-pox, have a less determinate form, running more or less into each other. However, towards the fifth day—the seventh day of the disease—their projection from the surface is more appreciable, and the swelling of the face, although far from having attained its maximum, is universal. The epidermis is elevated by a slight secretion of a milky appearance, and on the following day patches are to be seen similar to those produced by the application of a blister. This kind of vesication is sometimes so general, that the face looks as if it were covered with a mask of whitish-grey paper, of an opaline lustre, like *papier Joseph* or parchment: "Pergamenæ *speciem visu horrendam* (*cutis facei*) *exhibet*," as Morton said in his 'Pyretologia.' This is the pathognomonic symptom of confluent small-pox; it is never met with in the distinct form of the disease, except in a very

limited degree, when the pustules, being coherent, form a few isolated patches.

The swelling of the face increases up to about the end of the ninth day, when it has attained its maximum; it remains stationary on the tenth, and ought to begin to decrease on the eleventh day. The head and face, particularly at the angles of the jaws and around the ears, are much swollen—as much and more than in erysipelas; the eyelids, though less swollen than in distinct small-pox, participate in the general tumefaction of the face, and for four, five, or six days the patients remain without opening their eyes. The eruption does not spare even the globe of the eye; it involves the conjunctiva and cornea, and so gives rise to more or less severe ophthalmia, leading to perforations and purulent discharges, which may ultimately involve complete loss of vision.

I shall now resume consideration of the character of the eruption, and particularly the subject of the universal uplifting of the epidermis, caused by the confluence of the pustules. This sometimes proceeds to such an extent that the surface of the skin presents the appearance of one large phlyctæna. About the eleventh day (and not on the eighth, as in distinct small-pox) the phlyctæna becomes yellow, begins to be wrinkled, and exhales a horrible stench, which is never present in the distinct form of the disease.

From the second, sometimes from the first day of the eruption, salivation sets in. At first, the secretion consists of a fluid resembling clear saliva, slightly viscous, but the viscidity of which increases on the succeeding days, while at the same time the amount of fluid secreted goes on increasing till the sixth or seventh day of the eruption (eighth or ninth of the disease), when it is so enormous in quantity, that a patient will give off from one to two litres.[1] The inconvenience arising from this discharge is very great, and prevents the patient from sleeping. When he does fall asleep, with his head resting on the pillow, a constant flow of saliva inundates the bed, and, awaking, is followed by great discomfort; finally, he is tormented by a burning, inextinguishable thirst. The salivation is coincident with the appearance of pustules on the inside of the mouth, veil of the palate, and pharynx. I say salivation is coincident with, not that it is dependent on, the presence of pustules on the mucous membrane of the mouth. The salivary excretion may

[1] A litre is rather more than a British Imperial quart.—Translator.

be connected up to a certain point with extension of the inflammatory excitement to the glands; but it is no less true that excessive salivation in confluent small-pox is a phenomenon in some degree independent of this excitement, and dependent, perhaps, upon the essential nature of the disease. In proof of the accuracy of this statement, it is important to call attention to the fact that salivation does not take place in distinct small-pox, even when there are numerous pustules on the buccal mucous membrane. We had an example of this in a young man, who, in July, 1857, lay in bed No. 11 *bis*, St. Agnes' Ward. He had distinct small-pox, with an abundant eruption on the inside of the mouth, and yet there was no salivation.

On the third day of the eruption, evidence is afforded of the existence of the pustules, which become confluent, and cause inflammation of the entire mucous membrane of the mouth and pharynx. The swelling is greatest on the sixth day of the eruption, when also, as I formerly stated, the salivation is most abundant; it continues till at least the ninth or tenth day, the salivation likewise going on, and lasting one or two days after the swelling has somewhat subsided. There is, therefore, another cause for the salivation, as was well illustrated by the case of a young girl, who occupied bed No. 7 of St. Bernard's Ward. Every day she filled three or four spittoons. She stated that the act of spitting excited violent pain in the throat, which prevented her from swallowing the saliva. She was equally unable to swallow beverages, which she rejected after rinsing the mouth with them. I would not, however, maintain, gentlemen, that in this case salivation resulted solely from dysphagia, for in scarlatina, for example, in which there generally is very violent sore throat, salivation is not observed. Salivation, therefore, is a complex phenomenon, for which, although a certain number of causes may be assigned, it is not easy to give to each its proper share.

The patient coughs; his voice assumes a certain degree of hoarseness. These symptoms are explained by the affection of the larynx, to which organ the inflammation is propagated from the mouth and back of the throat, and which is also often invaded by the eruption. The laryngeal affections are not without gravity, for it sometimes happens that, in consequence of them, patients are suddenly carried off by fits of suffocation. You may have seen three cases of this kind in this hospital. Three small-pox patients, at the eighth day of the disease, which had run a perfectly normal course, were sud-

denly seized with a fit of suffocation which carried them off in a few seconds, before there was time for any one to come to their assistance. In one of them there was found, on examination after death, indications of inflammation of the larynx, and variolous pustules below the glottis.

The salivation has generally reached its maximum about the ninth or tenth day of the disease, and on the following day; consequently, on the eleventh day of the disease, or occasionally a little later, it begins to decrease, and at the same time the swelling of the face diminishes.

At this stage appears a symptom, not less momentous than the salivation and swelling of the face; it is *swelling of the hands and feet*. This is an essential part of an attack of confluent small-pox; it succeeds the salivation, and still more the swelling of the face. When it fails to appear the patient almost invariably dies. Since I began practice I have only seen three patients recover from confluent small-pox, without having swelling of the hands and feet, after the subsidence of the salivation and tumefaction of the face. Of the three individuals to whom I now refer, one was in our wards two years ago; another was our patient during the current year, and some of you may have seen him, and may recollect that he was very ill indeed; for more than four months he suffered from large abscesses, and numerous very painful boils on the limbs and other parts of the body. The third was a young man who occupied bed No. 12 of St. Agnes' Ward, in August, 1861. He reached the thirteenth day of an attack of confluent small-pox without having had any tumefaction of the extremities. The general symptoms were so grave that we were despairing of his recovery. Under these circumstances I resolved to subject him several times a day to ablutions with cold water, giving him, at the same time, the sulphuric lemonade recommended by Sydenham. To our great joy, he was somewhat better next day, and in four days convalescence was established, although there was no swelling of the hands or feet.

Is not the red œdema of the hands and feet seen in confluent small-pox simply a consequence of a natural determination to these parts, in itself salutary, and proportionate to the number of pustules which are proceeding to normal inflammatory evolution? If it be so, we can understand why cold affusions, by acting energetically upon the whole system, may re-establish the functions of the skin, and bring the disease back to its normal course.

The tumefaction of the extremities sets in at the end of the ninth day with rather acute pain, which on the eleventh or twelfth becomes very violent. The swelling and pain then cease. It is a symptom similar to the swelling of the face, and, like it, depends on the maturation of the pustules. As in distinct so in confluent small-pox, the face-pustules attain their full development sooner than those on the body; and they are smaller than in the distinct form of the disease. The pustules mature more quickly on the trunk than on the extremities; concurrently with the inflammation which arises around the pustules (commencing about the tenth day, and attaining its maximum on the eleventh or twelfth), it is not surprising that the extremities should swell, and that the swelling of the face should cease. But the great question to be determined with reference to the swelling of the hands and feet is:—What is the value of this symptom? Sydenham, Morton, Van Swieten, and Borsieri attached immense importance to it, and in relation to prognosis I wish again to insist on its great value, and to repeat that swelling of the hands and feet is a necessary phenomenon in confluent small-pox, that patients almost invariably succumb when it is absent, unless there be a great critical discharge by the kidneys or bowels. When there is absence of the swelling of the hands and feet diarrhœa is as beneficial as it is to be dreaded in opposite circumstances. This opinion was held even by Sydenham and Morton, who, as a general rule, considered purging a formidable complication.

Swelling of the extremities, which is the rule in confluent small-pox, is an exceptional occurrence in the distinct form of the disease, and is only met with in it when the pustules are numerous on the hands and feet. In a young woman, whom we had as a patient in the Hôtel Dieu, in January, 1861, with normal distinct small-pox, although she bore three true vaccination marks, there occurred tumefaction of the hands and feet at the end of the ninth day, when, however, the face and neck were still very swollen. The swelling of the hands and feet continued to the thirteenth day.

At the beginning of confluent small-pox, as I have already said, nervous symptoms appear pretty frequently, such as tremors and sometimes slight delirium. When this delirium is met with, it generally occurs as a transient phenomenon just as the eruption is coming out, and returns about the third day of the eruption (fifth of the disease), and continues to the end of the attack, or at least to the thirteenth or fourteenth day of the disease. When it is violent—

when it assumes the form of typhic delirium—when it is accompanied by *coma vigil*, picking the bed-clothes, and twitching of the tendons, its prognostic significance is exceedingly grave.

The same may be said of diarrhœa. It generally shows itself in the early days of the disease, and ceases about the fifth day from the date of the invasion, that is to say, about the second or third of the eruption; but when it continues, and is violent about the eighth, ninth, and tenth days, the prognosis is unfavorable, except in the exceptional conditions formerly mentioned; in ordinary cases patients who have violent diarrhœa at or after the eighth day almost always die. This, however, was not the opinion of Hoffmann, who, so far from dreading diarrhœa, even when violent, in confluent small-pox, looked upon it as beneficial; but the opposite opinion, which I hold, is that of Sydenham, Morton, and Borsieri.

When the eruption has reached its thirteenth or fourteenth day, just when the swelling, which has for two or three days left the face, appears in the extremities, the patient exhales, as I have already said, an insupportable fetor. If you raise the bedclothes you are shocked with the disgusting smell which comes from the putrefaction of the pus exuded by the pustules. This putrefaction has, perhaps, something to do with the serious complications which occasionally supervene at this period. There may be absorption of the putrescent fluids and miasms, poisoning the blood, and producing in that way the grave symptoms which arise. I dare not, however, assert positively that facts are in exact harmony with this theory, which has Borsieri as a supporter. With a view of preventing the dreaded purulent infection, some practitioners, as you are aware, are in the habit of opening the pustules as soon as possible, and bathing the skin very frequently with chlorinated lotions. This practice, at least to the extent of opening the pustules, was followed by the Arabian physicians Avicenna and Rhazes. Ambrose Paré also adopted it. It may be very beneficial; but its performance must, in my opinion, be often exceedingly difficult. The baths have likewise great utility, as have all measures which conduce to cleanliness—a maxim strongly put by Van Swieten, when he recommended that the patients should have their linen changed frequently. It must be clearly understood, however, that such proceedings demand great precautions, and that in our hospital practice it is sometimes very difficult to carry out the very useful precepts now noticed.

As the disease advances, as the patient enters the third week, the

delirium, which had continued up to the thirteenth or fourteenth day, ceases; the fever, however, continues, and generally goes on till the twentieth, twenty-first, or twenty-second day, which is accounted for by the persistence of the violent inflammation of the skin, still almost entirely covered with pustules more or less deeply ulcerated. Then, however, the crusts formed upon the ulcerated surfaces present the appearance of ecthyma crusts; they become detached, leaving the dermis more or less scooped out. New crusts, thinner than their predecessors, then form; they also fall off, and are succeeded by others thinner still; and so on during two, three, or four weeks, crusts succeed each other on the small ulcerations which ultimately cicatrize, leaving the scars more or less rugged, which seam the faces of persons who have gone through confluent small-pox.

After the fourth week of the disease it often happens that the fall of the crusts is followed by a true furuncular diathesis. Patients may have, on the surface of the body, as many as twenty, thirty, or even a hundred boils, causing excruciating pain, and succeeding each other so as to maintain the crop for from two to six months.

The tendency to suppuration, consecutive to confluent small-pox, not only shows itself in an outbreak of boils, but also by the formation of abscesses more or less deep seated. Too often these abscesses prove very dangerous complications. We see our convalescent patients suddenly seized with rigors and the most intense fever; they complain of pain in the deep-seated muscles; and the fluctuation detected on examining the parts gives clear evidence of the existence of a more or less considerable collection of pus to which it will be necessary to afford an exit. The abscesses, like the boils, go on in succession for from two to six months, unless the patient unfortunately succumbs previously, as is generally the case, exhausted by the protracted suppuration. Almost always these abscesses occur in the limbs. Sometimes they are situated around the anus, and give rise to detachment of the rectum from the surrounding cellular tissue, necessitating, at a later date, the operation for fistula. In some still rarer cases the abscess may be more deeply seated, and cause dreadful complications.

On the 7th February, 1861, we performed the autopsy of a lad who died after an attack of confluent small-pox, whom you saw when he occupied bed No. 21 of St. Agnes' Ward. During convalescence he had numerous boils and subcutaneous abscesses, some of which opened spontaneously, and others of which were opened by us. He

nevertheless complained of acute pain in swallowing, which I attributed to the persistence of an inflammatory condition of the pharynx and curtain of the palate, which existed when the small-pox was running its course. About the end of January, when an epidemic of influenza was prevailing, he was seized with acute bronchitis, and we soon afterwards detected slight pleurisy at the back of the left side of the chest. The inflammation of the chest seemed to have moderated, when, on the 5th of February, I found him unable to breathe in the horizontal position, with difficult, wheezing inspiration, and very laborious expiration; the symptoms of œdema of the glottis were unmistakeably evident; I was under the impression that there was necrosis of a portion of the larynx, and erysipelato-phlegmonous inflammation of the aryteno-epiglottidean folds. I ordered a solution of tannin to be applied to the back of the pharynx by means of the apparatus of Mathieu, and at the same time directed that everything should be in readiness for tracheotomy. At four in the afternoon the symptoms had become so formidable that the sister of the ward summoned the chaplain before she sent for the *interne* on duty; when the latter arrived, the patient was dead. You will recollect that, on examination after death, we found œdematous inflammation of the aryteno-epiglottidean folds, and an abscess, as large as a pigeon's egg, between the œsophagus and back of the larynx; this abscess, limited in front by the denuded cricoid cartilage, spread under the cellular tissue within the larynx, and bulged out considerably into the larynx above the vocal cords.

It is not usual for œdema of the glottis to occur in this manner in cases of small-pox. It appears, as I have already said, between the ninth and twelfth day of the disease, when the eruption is very confluent on the mucous membrane of the throat and larynx; the tumefaction of the aryteno-epiglottidean ligaments comes on as does that of the eyelids and hands; and you have seen a young man die in our wards, in a few hours, suffocated by this form of variolous œdema of the glottis. But, gentlemen, you can remember a young woman in St. Bernard's Ward, in 1860, who, about the twelfth day of an attack of small-pox, was seized with dyspnœa, hoarseness, and wheezing inspiration, and who, nevertheless, was completely and quickly cured by injecting a saturated solution of tannin into the back part of the throat.

We have lately had an opportunity of observing a case of distinct small-pox in a child of twenty months, which is full of clinical instruc-

tion. This patient, on the third day of the eruption, was seized with dyspnœa, which seemed to be chiefly dependent on œdematous laryngitis. Tracheotomy was performed: at the moment of opening the windpipe, two false membranes were thrown out through the wound. The child died a few hours after the operation. An autopsy showed that the small-pox had been complicated by a pseudo-membranous inflammation extending to the larger bronchial tubes; on the right side there were isolated masses of purulent pneumonia, and on the same side a small quantity of purulent effusion. This is an exceedingly rare complication, but still it is well to notice it to you.

I take this opportunity of remarking that all inflammatory action has a great tendency to become purulent in cases of small-pox, and that we see this in the inflammatory affections of the cellular tissue and parenchyma of organs. But, in addition to this tendency, the result of a special diathesis which belongs to small-pox, another complication may arise, viz., metastatic abscesses presenting analogous general symptoms to similar collections of pus occurrring after amputations and in puerperal women. This manifestation of metastatic abscesses begins particularly between the ninth and fourteenth day of the disease, that is to say, when the skin is covered with a sheet of pus. Possibly there exists at this time capillary phlebitis, as the starting-point of the purulent infection, a view maintained by Ribes, and which Legallois has endeavoured to establish in his essay on purulent infection. The existence of capillary phlebitis in small-pox has not been demonstrated, but the hypothesis of its presence becomes very truth-like when we recollect that we sometimes meet with erysipelas of the arms and legs in confluent small-pox; in these cases the lymphatic vessels or veins may participate in the purulent inflammation of the skin, and become the cause of infection.

It is only in exceptional cases that distinct small-pox is fatal; but we have said enough to show that it is far otherwise with the confluent form of the disease. The history of epidemics proves this: in some epidemics, the half; in others, four fifths; and in others, less fatal, we find that one third die of those attacked. It is therefore the most deadly of all pestilences; the mortality is much in excess of that from yellow fever or cholera. The terrible feature of small-pox is, that it not only kills in the acute stage, but even after it seems to have left the patient, and when all danger appears to be past. It proves fatal by the deep-seated suppurations of which we have spoken—suppurations which invade the cellular tissue of the limbs,

and likewise become developed in the serous cavities, more frequently in the pleuræ than in the peritoneum; it proves fatal by peripneumonia, which rapidly proceeds to suppuration, and that so late as the second or third month from the beginning of the eruptive fever. We are then right in saying, and repeating, that small-pox is the most formidable of epidemic diseases; for while other diseases strike down their victims, they rarely do so during convalescence.

In small-pox, when death occurs during the course of the disease itself, it occurs at a period which it is necessary to indicate, inasmuch as it is of the highest importance to know when to expect the fatal issue, so that we may be able to foresee and predict it. In confluent small-pox the patient very seldom dies before the eleventh day, and, in general, the most fatal epochs are the twelfth, thirteenth, and fourteenth days. However alarming the symptoms may be, even when death seems imminent on the seventh or eighth, we may hope that life will be prolonged at least to the eleventh or twelfth day. Sometimes, nevertheless, the disease terminates fatally within the first five or six days, but this is only when it has assumed an anomalous form, and is of an exceptionally malignant type. Quite suddenly, and without apparent cause, the strength fails, unusual symptoms, not in accordance with the ordinary course of the disease, show themselves; there is a formidable increase in the nervous symptoms—in the delirium, coma, prostration, anxiety—and also in the dyspnœa, although there is no appreciable thoracic lesion. A rapidly fatal issue is particularly apt to take place in those frightful cases of hæmorrhagic small-pox, of which we had some in the hospital, and of which I shall immediately speak.

Anasarca, which supervenes in the last period of scarlatina, and occasionally, though rarely, at the end of an attack of measles, also occurs in confluent small-pox; it is rarer than in scarlatina, and more frequent than in measles.

Albuminuria is almost as common in confluent small-pox as in scarlet fever. There is this difference, however, that in scarlatina the albuminuria appears during the decline, and in confluent small-pox during the acute period of the disease. Extensive observations made by Dr. Abeille[1] have shown that, in confluent small-pox, as in scarlatina, albuminuria is met with in about one third of the cases. Developed at the beginning of the attack, the renal affection may

[1] Abeille:—Traité des maladies à urines albumineuses et sucrées.

continue to the end of it, so as then to present a kind of analogy with scarlatinous albuminuria. Although albuminuria does not show itself nearly so often during convalescence from small-pox as in the decline of scarlatina, the occurrence is sufficiently frequent to be remembered as a possible complication. The same remark applies to *hematuria*, an affection which often precedes and announces the existence of scarlatinous albuminuria. It is rarer in confluent small-pox than in scarlatina; and when it does occur, it is at the commencement of the disease, and not during the period of its decline. Independently of the cases in which the hematuria is connected with Bright's disease of more or less transient character [*affection Brightique plus ou moins passagère de reins*], there are others in which passing blood by the urethra constitutes an epiphenomenon of the most serious import. Such is it when coincident with nasal, buccal, bronchial, and subcutaneous hæmorrhages, as in the terrible forms of the malady described by the ancients as *variolæ nigræ*, or black small-pox.

Many of you, gentlemen, ought still to recollect two cases of this kind which we saw, in 1860, in the wards of our colleagues, Drs. Legroux and Pelletan. The two patients to whom I refer had bleeding from the nose, mouth, eyes, anus, urethra—in point of fact, from all the emunctories—accompanied by a general subcutaneous eruption of frightful intensity, of a violet-red colour, like the lees of wine, so that the individuals looked as if they had been soaked in vats full of the residuum of pressed grapes. You recollect that some of the pustules were stained reddish-black by the blood with which they were filled, and you were, no doubt, particularly struck by the small number of the pustules, although the date of their appearance, within forty-eight hours of the pyrexial invasion, left no room to doubt that the disease was confluent small-pox.

Some years earlier, in 1854, we had analogous examples in our wards. But in them—to which I shall return when I speak of measly and scarlatinous eruptions in modified small-pox—in them the hæmorrhagic complications were essentially milder, and had not the disastrous consequences seen in the other two cases, the small-pox having been modified by antecedent vaccination. The two unfortunate patients of 1860 were seized with delirium, restlessness, and high fever, and sunk rapidly from the beginning of the attack.

In young children small-pox presents important peculiarities in its onset, course, and issue.

In them the period of incubation is the same as in the adult, viz., from nine to eleven days. The initiatory symptoms often pass unobserved, because the little patient cannot tell what he feels; still, the experienced clinical observer will always be on the outlook for the eruption of small-pox, when he meets with quick pulse, vomiting, diarrhœa, restlessness, convulsions or coma, in an unvaccinated child, whose previous morbid condition was inadequate to explain the appearance of these symptoms. Two or three days after these epiphenomena a variolous eruption, distinct or confluent, is observed. It appears on the surface of the skin, in successive outbreaks; in some places it may be distinct, while it is confluent in parts where there is a previously existing cause of irritation, as on the hips and other parts irritated by the contact of the urine and the swaddling bands. The development of the pustules in children differs in no respect from their development in adults; but the younger the patient is, the more reason is there to fear that the course of the disease will be anomalous. Thus, it is not uncommon in infants of one, two, or three months to see the eruption fade on the first day of the appearance of the papules; under such circumstances, the surface of the body is very pale, and the papules have an opalescent aspect. At other times, and particularly about the second, third, or fourth day of the eruption, it has a hæmorrhagic appearance, the herald of a speedy and fatal issue; the patients remain drowsy, with small, thready, irregular pulse, and they die without a struggle. It sometimes happens that, immediately after the first outbreak of the eruption, they take the breast eagerly; their skin continues hot, their pulse somewhat frequent, but regular, and they support well the fever of maturation. Infants above a year old may recover, but under that age almost invariably die. On the fourteenth or fifteenth day, just when we are believing that the case is progressing favorably, death takes place, either without a struggle, or after one or two fits of convulsions.

These remarks show how very reserved we ought to be in our prognosis of small-pox in childhood, even when to all appearance the case seems to be going on well. Small-pox, confluent or distinct, is almost always fatal in children under two years of age; they may be carried off without having had any of the complications looked upon as so inauspicious in adults. When death occurs during the first few days, it seems to be caused by variolous toxæmia; when it occurs later, say about the third week, it is

apparently the result of the long struggle having exhausted the vital power of the patient. Need I recall to your recollection that, in distinct small-pox in children, diarrhœa is not a serious complication, that, on the contrary, it seems, like perspiration in the adult, to be a favorable symptom; that in them, in the confluent form of the disease, it takes the place of salivation, and ceases spontaneously on the appearance of tumefaction in the hands and feet? Young children, when they do not succumb, often have, like adults, numerous abscesses on the surface of the body.

As it is, for obvious reasons, in the wards of an hospital, that there is the most danger of contracting small-pox, the physician in charge ought at once, on the admission of children, to inquire whether they have been vaccinated; and if they have not, his first care ought to be to have the operation performed, unless there are circumstances which constitute a positive contra-indication.

The treatment of true small-pox, distinct and confluent, has now to be considered. Necessarily, I shall be brief on this subject, for there is rarely room for energetic medical interference in the eruptive fevers. These diseases run a natural course, which is inevitable and definite; this remark is strictly true in respect of measles and scarlatina, but its correctness is even more strikingly manifest in small-pox, the different periods of which are distinctly determined, mathematically limited, so to speak, according to the form of the disease being distinct or confluent.

Distinct small-pox is generally a mild malady, and may generally be left to itself. We may rest satisfied with prescribing cooling beverages, and slightly acidulated dict-drinks, such as lemonade, orangeade, and currant-water.

Confluent small-pox, unfortunately, does not call for any very different treatment. In recent times, the advantages resulting from the employment of certain medicines have been vaunted, but the facts upon which such opinions rest are far from being conclusive. My practice is, excepting when there are complications involving special indications, to confine myself to prescribing diet-drinks acidulated with sulphuric acid, as recommended by Sydenham and Van Swieten under the name of antiseptics.

When there is much cerebral disturbance, baths and the cold affusion do real service, though less than in scarlatina. Baths and lotions, not exactly cold, but of a moderate temperature, demand a

very important place in the hygienical treatment of small-pox. We have already seen that some practitioners bathe their patients frequently with a view of preventing the purulent infection likely to result from the formation and stagnation of variolous pus on the surface of the body. It is an equally useful measure to change the linen frequently; and without going the length of Van Swieten, who inculcates exposing it to the vapour of aromatic substances, to get rid of the lye and the soapy smell, one cannot be too careful as to the way of carrying out in practice the frequent change of linen. The risk of exposing small-pox patients to cold air has been exaggerated. Sydenham combated the erroneous opinion that persons suffering from eruptive fevers ought to be kept in rooms at a high temperature; there is nothing so dangerous as this vulgar prejudice, which caused patients to be smothered under a load of bedding, and to be placed in chambers having every chink stopped up, and the airing of which was hardly ventured upon. Cold is less dangerous than excessive heat. For this reason, Sydenham prohibited the too much covering of small-pox patients, and in distinct small-pox, in warm summer weather, he did not confine them to bed. Cullen and Stoll went still further, and directed that they should be exposed to moderately cool air.

Diarrhœa in confluent small-pox is a terrible complication, when it continues till the eighth, ninth, or tenth day; it requires to be kept in check by small doses of opium, but constipation must be equally guarded against. This was the opinion of Sydenham, Freind, Lobb, Huxham, and many others. Morton himself, who so much dreaded intestinal flux, recommended, nevertheless, the employment of lavements, and even of purgatives, when the patients were without stools, and the reaction excessive; he advised similar means to be resorted to when it was desirable to excite a salutary crisis, in consequence of salivation ceasing, without the swelling of the extremities taking place.

In small-pox, as in typhoid fever, it is not judicious to place our patients on too low diet: they ought to have meat broth; and light soups, made with or without meat, should be given frequently and in small quantities throughout the twenty-four hours.

MODIFIED SMALL-POX—*does not differ from true Small-pox in its essence.—It differs from Varicella or Chicken-pox.—It was well known before our times.—In the period of invasion it is Identical with Small-pox.—Scarlatiniform and Petechial Eruptions at the commencement.—Black Small-pox.—Particular Modes of Desiccation.—Is Seldom a Dangerous Disease.*

Gentlemen:—Let us now attend to the subject of MODIFIED SMALL-POX.

In recent times a proper custom has arisen of designating by the terms *rheumatoid* pains and *diphtheroid* exudations, the pains and exudations which resemble rheumatic pains and diphtheritic exudations, the object of using these new names being to point out that there is only an analogy in the manifestations, and not an identity in the nature of the maladies; thus, the pains which belong to syphilis may be called rheumatoid, and we may designate as diphtheroid the pultaceous exudations which proceed from certain inflammatory affections of the mucous membranes of the mouth and genital organs, not in any way dependent upon the general disease named diphtheria. If it was right to introduce this phraseology, it would be wrong to continue to apply the term "*varioloïde*" to modified small-pox, as it would leave room for supposing that the natural and modified diseases are essentially different from each other. Henceforth, therefore, we shall substitute for the word "*varioloïde*" the expression "*variole modifié.*"

Modified small-pox has been observed long ago. Such of you as would wish to read the histories of anomalous epidemics of small-pox by Sydenham, the 'Commentaries' of Van Swieten, and the Institutes of Borsieri, will be soon convinced that long before the discovery of vaccination persons had been observed to be affected with a form of small-pox presenting all the characteristics of the modified small-pox of the present day. The modified disease showed itself in those who had had small-pox previously, whether communicated by accidental contagion, by intentional inoculation, or by intra-uterine communication; this has been demonstrated beyond the possibility of doubt in our day, and was perfectly well known to the ancients. One cannot too often peruse and reperuse the interesting passage in the 'Commentaries' of Van Swieten on Boerhaave's 'Aphorisms,' in which, when discussing the subject of

second attacks of small-pox, the illustrious physician of Vienna describes several kinds of modified or bastard small-pox, although he has confounded under the name of *variolæ spuriæ* chicken-pox and small-pox, which are essentially different from one another.

Modified small-pox is simply small-pox modified either by antecedent small-pox, or by antecedent vaccination. Varicella or chicken-pox is, on the contrary, a special and specific malady, having no relationship whatever with small-pox. It is easy to demonstrate the truth of both statements. When we come to study varicella we shall see that it never engenders small-pox, just as small-pox never engenders varicella. Again, vaccination has no preventive influence against varicella. With respect to modified small-pox, we see that it is very different. If a patient suffering from natural small-pox, distinct or confluent, enter a ward where there are individuals who have been vaccinated, but who no longer enjoy the vaccinal immunity in a sufficient manner, these individuals may take the disease; but it will present features different from those of natural small-pox; they will, in fact, have modified small-pox. Again, if a patient affected with modified small-pox, in its simplest and mildest form, be placed in contact with one who has neither had small-pox nor been vaccinated, the latter may contract the disease; and if so, it will not be the modified form, but natural small-pox, distinct or confluent; he, in his turn, may communicate the variolous contagion to a third person, in whom the case will assume the natural or modified form, just as he has or has not been vaccinated—that is, just as he may be in the condition of the first or second patient. Such cases as I now refer to, you have seen; they are quite sufficient to demonstrate, rigorously and incontestably, the absolute identity of the modified and the natural small-pox. This identity may also be demonstrated in another and more direct manner.

An imperious necessity has several times obliged me to practise inoculation, both in this hospital and in my wards for children at the Necker hospital. Having no vaccine lymph, and small-pox being prevalent in the wards, I hoped by inoculation to impart a milder form of the disease than that which the persons I inoculated might contract from the patients who had small-pox. You can understand that, under such circumstances, I only inoculated with virus taken from a case of modified small-pox, in which the characters of the distinct form of the disease were as well marked as I could possibly find them. Now, in spite of that precaution, I

always communicated natural small-pox, of the distinct form, it is true, but still unmistakeable, natural small-pox. So legitimate was the disease I imparted, that if some days after recovery I introduced the vaccine matter into one arm, and the variolous matter into the other, neither declared themselves. The individual had lost his aptitude for contracting the disease, which, like the other eruptive fevers, does not attack the same person a second time, save in exceptional cases. Small-pox, natural and modified, are, therefore, identical, because they reproduce natural small-pox.

During the first quarter of this century the existence of modified small-pox was almost disputed. However, at the London Small-pox Hospital persons were from time to time received who said they had been vaccinated; and Jenner himself avows having seen some such cases; but as there was a desire at that time to make out that vaccination could never fail, it was alleged that vaccinated persons who took small-pox had been badly vaccinated, and their attacks were looked upon as natural small-pox. At last evidence became irresistible, when about the year 1822 epidemics of small-pox were seen to strike vaccinated populations, when three years later they reached Paris, where in recent years they have continued to prevail.

The influence which the variolous matter exerts on the economy, and the modifications which it imprints on the organism, being necessarily subordinate to the predisposition acquired by the organism under the variolous influence, or (which is the same thing) under the influence of antecedent vaccination, it necessarily follows that a second variolous inoculation will produce on the economy various effects proportionate to the degree of immunity previously conferred upon it, and which it still possesses more or less completely. Also, although modified small-pox is in its essence identical with natural small-pox, it is far from being identical in its forms. In place of having, like natural small-pox, fixed and precise features, it even presents essential differences from itself, and has no settled character. So correct is this statement, that the only way to describe modified small-pox is to speak of each of its numerous varieties as I now propose to do.

There is one period in which modified is always identical in symptoms with natural small-pox; that is, the period of invasion. However much attention you may bestow upon initiatory phenomena of the disease, it will be as impossible for you as it was for me to

establish a difference between symptoms of each during that period. Rigors followed by heat, anxiety, headache, pain in the epigastric region, nausea, retching, vomiting, pain in the back, feebleness, paralysis of the inferior extremities and bladder—such is the train of prodromic symptoms which alike supervene in modified and natural small-pox. In both the symptoms are mild, if the case—be it natural or modified small-pox—is going to take the distinct form; and in both they are more or less violent, if it is going to take the confluent form. The eruption comes out on the same days and in the same manner; that is to say, on the fourth day in the distinct, and on the second or third in the confluent.

Here, thermometric investigation furnishes valuable information; thus, for example, the temperature, which had risen as high as 40 or 41 degrees, suddenly falls to about 37 degrees on the appearance of the eruption. This rapid decrease of heat takes place continuously, and not slowly, as in distinct small-pox. The rapid subsidence of heat may enable us to diagnose modified small-pox, when, from the apparent gravity of the symptoms, we might have supposed that the case was one of natural small-pox. Let me add that, in modified small-pox, we begin, as pustules appear, to discover some of the characters of anomalous small-pox described by Sydenham, such as a premature appearance of the eruption in the distinct, and a retardation of it in the confluent form.

Delirium, as we have seen, may supervene in confluent small-pox during the period of invasion, and continue to the end, the patients dying about the twelfth day. In modified small-pox, cerebral complications are observed more frequently than in natural small-pox; but there is this capital difference, that they have not an unfavourable prognostic signification in the former. Last year, among others with modified small-pox, we had some in our wards who were a prey to violent delirium, which, after continuing, not only on the morrow of the eruption, but also for the two or three following days, ceased abruptly on the seventh or eighth day of the disease, when the patients became convalescent.

It is more common to meet with anomalous cutaneous eruptions, according to the prevailing epidemic constitution, in modified than in unmodified small-pox; they appear the day before or simultaneously with the pustular eruption. Sometimes they so much simulate, as to be mistaken for, the eruption of measles, even when they are looked at closely; still more do they sometimes resemble the

exanthem of scarlatina. The spots are small, of a more or less deep red colour, sometimes blackish, nearly always running into each other, so as to form large patches, hæmorrhagic looking, to which the English have given the name of *rash*.[1] This is in a slight degree that of which I spoke of to you as black hæmorrhagic small-pox, recalling to your recollection the terrible examples we had in the wards of our colleagues, MM. Legroux and Pelletan. These hæmorrhagic scarlatiniform eruptions, which in natural small-pox constitute an alarming symptom, do not lead to an unfavorable prognosis in modified small-pox. They generally show themselves in the groin, on the thighs, and on the lower part of the abdomen. They do not disappear on pressure with the finger, or at least there remains a greenish-yellow mark, which quickly acquires the reddish hue, of a more or less violet shade, momentarily effaced by the pressure of the finger. This rash is sometimes more uniformly diffused; the condition of the patient is then apparently more serious; and I recollect that, in 1854, we had in our wards three remarkable cases of modified small-pox, accompanied by hæmorrhagic scarlatiniform and measly eruptions, which presented very alarming symptoms at the beginning of the attack.

In two of these cases, to which allusion has already been made, the patients were young women between twenty and twenty-three years of age, who came into the hospital complaining of violent pains in the loins, nausea, vomiting, and rigors; the pains in the loins were accompanied by extreme debility in the inferior extremities and partial paraplegia. On the third day in one case, and on the fourth in the other, we saw an eruption of small red livid spots, varying in size from a pin's head to a lentil; they did not disappear on pressure. In one of these young women, the eruption was limited to the groins and axillæ; in the other, although it was more confluent in these situations, it likewise covered the upper part and base of the neck; it showed itself on the legs, where it was of a deep shade, and was even disseminated over the entire surface of the body, which presented an appearance of small dots, of a bright rosy hue, which became effaced on being pressed by the finger. This eruption was

[1] The author is evidently not aware that English physicians, as well as the general public, use the term *rash* when speaking of any exanthematous eruption, and that the word, except with the assistance of one or more other words, does not indicate a special exanthem, nor a particular form of exanthem.—Translator.

more copious on the following day; but on that day, which was the sixth from the beginning of the disease, the characteristic eruption of small-pox came out. The hæmorrhagic discolorations enlarged still more on the second day from the appearance of the pustules, and during the night the patient had slight bleeding from the nose. She had at that time persistent fever, much delirium, and great restlessness, both of which continued till the eleventh day of the disease. At that date, the greater part of the variolous pustules aborted, and the rest desiccated; while simultaneously the general symptoms ceased without any treatment. Thus, in this case, there was not only scarlatiniform eruption, but likewise a true nasal hæmorrhage; and between the twelfth and thirteenth day of the disease the subcutaneous sanguineous stains left characteristic traces, some reddish and others yellowish. An additional cause of great anxiety was the continuance of the fever, delirium, and extreme restlessness up to the eleventh day. The nervous phenomena, however, ceased in an abrupt manner, and the patient recovered. In another young woman, and in a young man whom we had under observation about the same time, the general symptoms and hæmorrhagic eruptions were nearly as strongly marked as in the first mentioned of the two young women; and the issue was equally favorable. We had to do with persons who had been vaccinated, for we found true characteristic vaccinal cicatrices; and we had to do with modified small-pox. Under such circumstances, even when the symptoms have an alarming aspect, the case generally terminates favorably. I have hitherto spoken of cases of modified small-pox, in which scarlatiniform eruption remained after the appearance of variolous pustules; there are others in which it disappears rapidly, and may escape observation. It is a remarkable fact, and one to which attention was long ago directed, that variolous pustules are either not developed, or are only developed very sparingly in parts where the scarlatiniform eruption exists.

I have, gentlemen, been speaking to you of the scarlatiniform, and not of the scarlatinous eruption; and I have much insisted on the name *scarlatiniform*, which I have given to it. I wish still more to insist on this name, for I confess that I am at a loss to understand how grave men, hospital physicians, occupying an eminent position in our art, can constantly say and print that small-pox was complicated with scarlatina in cases similar to those which I have just brought under your notice. This deplorable mistake is made

by the anatomical school of pathology, which, determining the nature of a disease by one of its manifestations on the exterior of the body, does not take into account the constituent elements of the disease, the aggregate of which represents the morbid unity of which we ought to form a conception. The cases now under consideration have no more to do with scarlatina than with dothienteritis—no more than pneumonia, small-pox, or scarlatina have to do with typhoid fever, when typhoid symptoms appear in the course of an attack of any one of them.

Sometimes, though rarely, the eruption is measly. In July, 1862, we received into the clinical wards a young woman in the third day of an attack of small-pox. She had been vaccinated. The symptoms of the initiatory period had been rather severe; but there was nothing abnormal in the aspect of the case. At the visit-hour the patient had already some characteristic pustules; at the same time we found an eruption resembling measles on the hands, posterior aspect of the fore-arms, on the elbows, knees, and anterior surface of the thighs. It was displayed in irregular patches, separated by oddly-shaped intervals of white. The exanthem was morbilliform, and not scarlatiniform. But some of the red patches on the fore-arms and thighs presented a very particular character. In the centre was a small red papule, around which there was an areola of about a centimeter in diameter. The singularity of the appearance consisted in the injection of the dermis not proceeding outwards from the central papule, and diminishing in intensity as it got nearer the healthy skin; so far from this being the case, the discoloration was sharply defined by a narrow, bright-red band, between which and the centre, the hue was notably less deep in colour.

The characteristic eruption of modified small-pox comes out like that of the natural disease. It begins on the face, forthwith gains the trunk and limbs, and finishes with the hands in from thirty-six to forty-eight hours from the commencement of its appearance. It is at first identical with the natural variolous eruption. Like it, it is formed of small red spots, which become acuminated, and then flatten towards the third day. But generally from the third or fourth day of the eruption—the seventh or eighth of the malady—they undergo a remarkable modification, which is never seen in natural small-pox, whether distinct or confluent. In place of showing a tendency to increase up to the eighth day—in place of becoming surrounded by an inflammatory areola, and beginning on the nose and chin to be

covered with small, yellowish rough crusts, they dry up without exhibiting the inflammatory areola; and they leave in their place small hard, corneous projections, which fall by a sort of desquamation between the tenth and fifteenth days. Such is modified small-pox in its elementary form, and as it is known to the English by the name of "horn-pox."

In some cases, however, the pustules continue for from three to six days, or longer. If you examine three patients with modified small-pox at present in St. Agnes's Ward—one in bed No. 8, another in bed No. 11 *bis*, and the third in bed No. 17—you will see in the first that the pustules became horny on the eighth day of the eruption; in the second, they assumed that appearance on the ninth; and in the third, they did not dry up till the twelfth, thirteenth, and even fourteenth day. These three cases are examples of the varieties of the disease, which they show you is in reality abortive small-pox, and that is only developed on account of the morbific germ having been thrown upon a congenial soil. It appears, in fact, that there are certain diseases, among which small-pox is conspicuous, which, like the seeds of plants when sown in different soils, germinate and grow up in different manners; in soil suited to their nature, they spring up invested with all their natural characteristics, they blossom, shed their seed, and, in a word, attain to perfection; in a poorer soil they grow with more difficulty, scarcely blossom, and ripen badly; in a still poorer soil they germinate, but almost immediately die. The seeds of diseases, like the seeds of plants, are liable to degenerate. The quality of the germ, the receptive power of the soil, whether it be the earth or the human body to which the germ is committed, are not always the same. Under certain circumstances, the organism undergoes a constitutional change in virtue of which it is more or less fitted for the reception and germination of the morbific seed; whooping-cough, for example, impresses the economy in so special a manner that the same person will not take that disease twice, and the same is true in respect of scarlatina and small-pox. This is most conspicuously true in respect of the latter, though the explanation of the fact is as inexplicable in the one as in the others. As already said, small-pox and vaccination place the organism in that special condition in which it is incapable of again contracting small-pox. This resistance, however, to the morbific conception is not absolute. Second attacks of small-pox and attacks of small-pox in vaccinated persons do occur,

but in such cases the morbid germ does not grow up with its natural characteristics. The effects, as I before said, are proportionate to the degree of immunity which has been conferred, and this degree of immunity appears most frequently to depend on the longer or shorter interval which has elapsed between the second attack of small-pox and the antecedent small-pox or vaccination. If the vaccination is of recent date, the nature of the small-pox will be more radically modified, milder, for example, than if twenty-nine or thirty years had elapsed. Side by side with cases of benignant modified small-pox, you will see others which for ten or twelve days follow the exact course of natural small-pox; the swelling of the face and eyelids takes place, the pustules on the limbs are surrounded by an inflammatory areola, and pain is complained of in the regions which they occupy; then this swelling subsides more rapidly than in natural small-pox; the pustules on the hands, in place of attaining their maximum of development on the fourteenth, are filled with pus on the eleventh or twelfth, when they wither, instead of waiting till the eighteenth or up to the twenty-second day, as happens in distinct natural small-pox. The disease, in a word, in some individuals, after seeking to exhibit itself in its usual character, suddenly changes its manifestations, and terminates in a rather abrupt manner, while in others it altogether fails to develope itself.

In some persons the organism seems so refractory to the action of variolous matter, or, to continue the comparison which we formerly employed, the soil is so ill prepared to receive the morbific germ, that although there has been neither antecedent small-pox nor vaccination, the small-pox, when it is contracted, is modified. Dr. Firmin lately mentioned to me the following case which he had just met with in his practice:—A patient had been vaccinated by him, and the vaccination did not take effect. Some time afterwards, when he was thinking of repeating the operation, he was called to see the patient, whom he found suffering from distinct small-pox, which ran a course exactly like that of modified small-pox. Does not this case offer a certain analogy to that of the young woman who now lies in bed No. 18 of St. Bernard's Ward? She took small-pox a few days after her child, who has just died of that disease in its confluent form. This young woman was never vaccinated, and she never had small-pox, so she said; and she bore no traces either of vaccination or small-pox. On and after the tenth day, however, the case followed the usual course of the modified disease. The period of invasion

was characterised by general discomfort, great lassitude and muscular pains, nausea, and epigastric pain; of the usual symptoms, rachialgia alone was absent.

There are still two circumstances which remain to be noticed. In distinct, natural small-pox, there is a cessation of the fever upon the appearance of the eruption, but we see it return on the eighth day, when the pustules on the face are beginning to maturate, to continue during the ninth and tenth day, finally to cease on the eleventh. In modified small-pox, even when maturation begins on the eighth day, which is very unusual, there is hardly any febrile excitement, and it does not last for more than twenty-four hours; the temperature in the axilla is likewise at that time hardly raised. In confluent natural small-pox, at the coming out of the eruption, salivation appears, and is the great phenomenon of that form of the disease; then on the fifth day there is swelling of the face, which goes on increasing till the ninth, when it has attained its maximum, at which it remains on the tenth, and on the eleventh it diminishes simultaneously with the appearance of tumefaction of the extremities. In modified small-pox, even when very confluent, salivation almost never occurs, swelling of the face is rare, and when it does appear there is no swelling of the hands and feet.

Modified small-pox generally has a favorable issue, but it is not invariably a mild disease. Five years ago, I lost a relation by confluent modified small-pox. Delirium supervened at the beginning of the attack, and continued to the last; death took place on the thirteenth day, swelling of the face having previously shown itself. This person had been vaccinated, and bore evident marks of vaccinia; yet he died with the symptoms of confluent small-pox in a very slightly modified form. The immunity afforded by vaccination is nearly or wholly lost by some individuals after the lapse of a certain number of years; but even in such persons confluent small-pox, which is the only form of the disease fatal to those who have been vaccinated, does not present its normal characters.

Cases of a second attack of small-pox—a rare occurrence, I repeat—have been recorded by highly trustworthy authors. Diemerbroeck even mentions having seen individuals take the disease three times in three months; and Borsieri, referring to these cases, quotes others, and among them one celebrated in history, that of Louis XV., who died of confluent small-pox at the age of 74, although

he had had the disease when fourteen years old. I have had in my wards a medical student who, though he bore the marks of two attacks of small-pox, took it a third time, and that too in a rather severe form.

LECTURE II.

VARIOLOUS INOCULATION.

Advantages of Inoculation. — Experiments on Clavelisation.[1]— *Dangers of Inoculation and Means of diminishing them.— Methods of Inoculating.—The Mother-Pock and its Satellites.— General Symptoms.*

Gentlemen :—Nations dismayed, and physicians intensely occupied with the terrible ravages of small-pox, were in search of some possible means of protection from, or at least of some means of moderating, the scourge. Remedies alleged to be rational, and empirical nostrums seemed equally in vogue; but all prophylactic measures had alike proved failures, when, in 1721, a woman, Lady Mary Wortley Montague, announced to England that she had witnessed a practice at Constantinople, which afforded perpetual protection from the disease to all who availed themselves of it. This practice of variolous inoculation, derived from China and Persia, countries in which from time immemorial it had been in common use, as well as in Georgia, Circassia, and Greece, consisted in giving small-pox to persons in health. It was already known by experiment, that the prophylaxis of the pestilence was in the pestilence itself; it was known that those who had been once attacked, however mild the symptoms might have been, were henceforth in a condition to traverse small-pox epidemics with impunity, and to expose themselves without risk to the contagion of the disease; it was known that second attacks were exceedingly rare, and altogether exceptional; but it was also known, on the one hand, that small-pox could not be communicated at pleasure by simple contact; and

[1] *Clavelisation* is a term derived from *clavelée*, the French name for ovine variola, popularly known in England as "tag-sore," or "rot," or small-pox f sheep.—TRANSLATOR.

on the other hand, that even if it could be communicated in that way, there existed no method of moderating the attacks by subjecting the individual to the contagion of a mild case. Inoculation seemed to offer every desired advantage; while it conferred an almost absolute immunity for the future, it was attended by no danger. Never, it was said, has small-pox proved serious when communicated by inoculation; the disease has always assumed the distinct form, has probably left no trace of its passage, or, at all events, there have been none of those horrible cicatrices to deplore, which so often remain after attacks produced by contagion.

The wonderful statements of Lady M. W. Montague, who, when residing at Constantinople in 1717, had not shrunk from having inoculation practised upon her own son, a boy of six years of age, the new example which she gave, when, on her return to London, she proceeded to have her daughter also submitted to the same treatment, the successful results proclaimed by her, and of which she offered proofs, enlisted the sympathy of a great number of right-minded persons, both among physicians and in general society.

Experiments were speedily set on foot in England, where inoculation was soon adopted, and was ere long generally employed. The new practice (which had many opponents as well as adherents) was carried to America in the same year that it was introduced into England, and three years later it became known in Germany, where some of the children of the first families of Prussia were inoculated. The practice of inoculation did not obtain a footing in England, America, and Germany, without opposition; but opposition showed itself in France in an inveterate manner. It was absolutely prohibited when first proposed in 1723; and it was not till 1756, thirty-three years later, that any one ventured to try it. Although, in France, the movement in its favour originated in high places—for those first inoculated were the children of the Duke of Orleans—it was far from being general. Such of you as have a curiosity to know the different phases through which the question of variolous vaccination has passed in our own and foreign countries, ought to read its history as written by Sprengel.[1] The controversy ended in variolation being accepted and generally practised till it was dethroned by vaccination; and perhaps you still know of individuals who were inoculated at the beginning of this century, when, in

[1] SPRENGEL:—Histoire de la Médecine; traduite de l'allemand, par A. J. Jourdan, tome vi.

its turn, the discovery of Jenner was meeting with numerous adversaries.

At that epoch, although very advantageously replaced by vaccination, variolous inoculation, which at first had excited so much opposition, had rallied resolute partisans, particularly in England, where, as I have just told you, it was first introduced on its arrival from the East. It was employed in England down to 1841, and to eradicate the practice it was found necessary to pass a stringent Act of Parliament. It has now been everywhere entirely superseded by vaccination. Circumstances occur, however, in which, for reasons which I will explain to you, one is still obliged to have recourse to inoculation, notwithstanding the palpable inconveniences which it presents. I have found myself placed in such circumstances; and as it is my duty always to give you an account of my proceedings at the bed of the patient, I have something to say to you on the subject of variolous inoculation. As I stated when speaking of modified small-pox, I have repeatedly practised variolation. I did so for the first time long ago at the Necker Hospital, and more recently here, under your observation. But neither at the Necker Hospital nor at the Hôtel Dieu have I ever resorted to it, except when vaccine matter was not obtainable, and when a prevailing epidemic of small-pox placed in imminent danger the lives of the young children in our wards.

In practising variolation, I have always been anxious—and this is of the highest importance—to place myself as much as I could in the position of the inoculators of former times. Without hampering myself with the precautions which they considered necessary —without preparing, as they supposed, the subjects for the operation by their plan (precautionary measures which they themselves soon abandoned, having found them to be useless), I proceeded with a view to communicate the disease in as mild a form as possible. I was struck with a fact which belongs to veterinary medicine. The tag-sore of sheep is a malady identical in its general features with small-pox in the human subject, and the analogy between the two diseases is sufficiently great to enable us to derive from the study of the one practical lessons for the study of the other.

Since last century clavelisation has been practised by the most enlightened veterinary surgeons and farmers, whenever the disease has begun to prevail, with a view to prevent the ravages of an epizootia. In Bessarabia, where inoculation is still universally practised,

an agriculturist conceived the following plan for obtaining the mildest possible form of ovine variola; he selected a hundred sheep, placed them in a separate park, and then inoculated them. In nine or ten days the disease declared itself among the animals. The inoculator then took virus from one in which the symptoms were mildest, and with it inoculated a hundred other sheep. He repeated the same proceedings with a third series of a hundred sheep, selecting, as before, the animal in which the symptoms were mildest. The following results were obtained.

A considerable number of the first series died, the virus not having lost any of its energy. The disease, however, was less fatal than if it had been produced by ordinary contagion. The sheep of the second series had the eruption in the distinct form, and none of them died. For the third series the distinct character was still more decided than in the second, and in some cases the only eruptive manifestation was the development of a pustule at the point of inoculation. It was then supposed that this last result could be always obtained. The experimenter had obtained, in point of fact, a preservative virus, which conferred complete immunity, and produced an eruption limited to the mother pustule. Inoculation of aggravated tag-sore, performed on sheep so preserved, afforded absolute proof of the immunity which they had acquired, because it produced no manifestation.

These facts made a great impression upon me, and I asked myself whether the same results would be obtained in human as in ovine variola—whether, by successive series of inoculations in the human subject, an equally great modification of the disease could be produced as had been produced in the sheep, by which the eruption had been limited to a single pustule in the spot where the inoculation had been made. I tried the experiment at the Necker Hospital in conjunction with Dr. Delpech, then my *interne*, now my colleague as physician to the hospitals and *agrégé* of our Faculty. We obtained the desired result in some children, to the extent that the mother pustule, the master pimple (*le maître bouton*), the pustule of inoculation was alone developed, and that around it there were little pustules, its satellites. If we could be sure of always attaining equally fortunate results, inoculation ought to be the rule, for then it would be attended by no risk, and its consequences would be purely beneficial. The inoculation would be equally without danger to the person inoculated, and to those with whom he came in

contact. This localised variola, without general eruption or serious symptoms, would perhaps be no more contagious than a cow-pock. Unfortunately, matters did not turn out so propitiously.

In some cases, I attained the complete success of having only the pustule of inoculation; but in others, in which the very same virus had been employed, there were general eruptions, and, worse still, communication of small-pox to non-inoculated persons. In one case, regarding which I shall have to speak in connection with the subject of regeneration of vaccine virus, the small-pox resumed all its original violence, after having passed through a succession of individuals in a series of inoculations. This result is opposed to those recorded by the inoculators, who made out that the variolous virus becomes progressively milder as the succession of transplantations proceeds. The inconveniences of inoculation are, on the one hand, the risk of giving dangerous small-pox to an individual, and on the other the dangerous possibility of thus establishing a focus of contagion. It must be admitted that these inconveniences are serious, and they are precisely the inconveniences which, after affording arguments to the adversaries of inoculation, caused it to be abandoned after the discovery of vaccination; they are also inconveniences of such a character as to compel me to discontinue my experiments, and to reserve inoculation for the exceptional circumstances to which I have already alluded, and of which I shall again speak. It became my duty to renounce inoculation, from the fear that even by inoculating with virus derived from the mildest case, I might cause the death of persons who had neither been vaccinated nor inoculated, through their taking the disease in an aggravated form from the individual to whom I had given it. I should have acted otherwise, if it had been possible to isolate the persons inoculated. During an epidemic of small-pox, if I could not obtain vaccine virus, I should not hesitate again to try and to recommend a trial of inoculation, for I should not then feel the responsibility of propagating a disease which was already everywhere.

There is a small number of persons so constituted as not to take small-pox, though exposed a thousand times to its contagion, and there are also those to whom it cannot be given by inoculation; but it is more usual to find others who, though more or less insusceptible to the virus, manifest the disease very slowly after inoculation.

To take again the example from comparative medicine which I have already mentioned, it happens that when the tag-sore breaks

out in a flock of five hundred sheep, it does not attack all the individuals at once, but in succession, so that it rarely occurs that the epizootia has terminated in less than from three to five months. The explanation of this is that some of the sheep, in virtue of a special susceptibility, have at once taken the contagion, while others have required several repetitions of contact with it for the production of the same result. The same is observed in small-pox.

When, in former times, small-pox prevailed as an epidemic, attacking the entire population of a locality, hospital, barrack, or prison, it was observed that it showed itself at successive intervals on different sections, although every one had been equally exposed at first to the contagion. In fact, for the production of the disease, there must not only be its cause or morbific germ, but there must also be an economy, a soil, prepared to receive it: a special aptitude of the organism is wanted, without which there can be no *conception* of the contagion. Inoculation, by forcibly introducing the virus into the economy, without waiting for this aptitude to be developed, finds the subject in that state of unreadiness—the soil is not sufficiently prepared, and consequently the germ does not grow with the vigour which under other circumstances it would have manifested. Moreover, the inoculation can select the germ, that is to say, take the virus in the conditions which are most favorable. By employing matter from a *distinct* case which has been modified by antecedent vaccination, we attain the greatest probability of communicating a very mild variola, just as the Bessarabian agriculturist acquired by experiment the power of imparting to his sheep a very slight attack of tag-sore.

Lastly, inoculation practised during an epidemic is a preservative against aggravated attacks, protects individuals from contagion, the consequences of which it is impossible to estimate, while, within certain limits, we can estimate the severity of attacks induced by inoculation. It is an exceptional occurrence for inoculation with virus taken from distinct small-pox to develope the disease in its confluent form. When inoculation was first introduced into Europe, it was more common for it to cause confluent small-pox than afterwards, when vaccinators took the precaution to select their virus under the conditions which I have indicated; and by reading what our predecessors have written on this subject, I have become convinced that inoculation was day by day diminishing in danger, and might have become almost as harmless as vaccination.

Inoculation was formerly accomplished by inserting a thread impregnated with variolous matter in a small incision in the skin, the arm being the part generally selected for the operation. Kirkpatrick, in his 'Treatise on Inoculation,' said that it was sufficient to rub the wound with a bit of linen soaked in variolous matter. He also stated that threads impregnated with the virus, if shut up in well closed boxes, preserved their power for several months. To prove the great length of time variolous virus preserves its power, Dr. Sunderland, of Barmen, alleges that blankets saturated with the pus of small-pox preserved their contagious properties for more than two years, producing after that interval characteristic pustules on the udders of cows. The blankets referred to were used in his experiments upon the regeneration of cow-pox by communicating small-pox to cows. It was necessary, however, to cover up carefully these blankets with paper, and to keep them in a little cask in a shady, cool place, where the temperature never rose to more than 10° of Réaumur above zero. It is recorded that the Chinese kept the crusts of variolous pustules in porcelain vessels well stopped with wax. They inoculated by introducing into the nostrils tents of charpie covered with the dried matter.

At the end of last century, inoculators performed the operation in a manner that was simpler, quicker, and surer than those I have just described; it consisted in raising the epidermis by means of a lancet, so as to introduce the matter with which the lancet was charged. A prick is sufficient. The symptoms which ensue are the following: First of all, there are local phenomena; thus, on the second day after inoculation, there is visible, in the place where the puncture has been made, a small red pimple similar to that which results from vaccination. About the fifth day this pimple has become an acuminated vesicle; it sometimes exhibits in its centre the mark of the puncture, which has a sunken appearance, like an umbilication. On the seventh day the vesicle has become a pustule, and is surrounded by a slightly red areola, which becomes flattened, and assumes a bluish tint. Next day the inflammatory areola increases, and on the ninth and tenth days it increases still more. The pustule, however, continues to grow larger, becomes more depressed in the centre, and assumes more and more the bluish tint; its edges have an uneven, puckered appearance; there now arise upon the inflammatory areola a variable number of small pustules, ten, fifteen, or twenty true satellites of the mother-pustule, which at first contain a

limpid serosity, and afterwards some watery pus. At the same time the lymphatic glands in the axilla begin to be turgid; this turgidity has attained its maximum on the ninth day, after which it decreases, and about the fourteenth or fifteenth day it disappears. Generally speaking, in thirteen or fourteen times twenty-four hours, the pustule of inoculation has dried up, but there is sometimes formed below it a deep slough, which separates in from twenty to thirty days, leaving a more or less misshapen cicatrix. In general, however, there is no slough, and the crust falls, being succeeded by another, which in its turn also separates; and after a succession of crusts, there is at last a cicatrix larger than that which is left after vaccination.

The mother pustule, which is sometimes found when the disease has been communicated by contagion in the ordinary way, the "master pimple," to use the German expression, presents exactly the same characters as the pustule of inoculation. You have seen an example of this in a man who occupied bed No. 11 *ter* in St. Agnes' ward. He was seized when in our wards in June, 1857, with a varioloid affection. Besides tolerably distinct pustules developed on the skin, there was observed, on a level with the naso-labial line, a pustule larger than the others, with a diameter almost equal to that of a twenty-centime silver piece; it was deeply hollowed out—*cutim satis profunde exederat*, as Van Swieten said of this kind of pock, which he called the *master pokken*. A very red areola, as large as a franc piece, surrounded it, and was covered with small vesico-pustular satellites. The patient affirmed that the great pimple had appeared at least twelve days before those on the other parts of the body.

On the ninth or tenth day after the operation, the constitutional symptoms make their appearance. The patient has headache, pains in the loins, vomiting, and, in a word, all the primary symptoms of small-pox. About the eleventh, twelfth, or thirteenth day, the specific eruption is seen, which in general is but slightly confluent, and follows the course of normal or sometimes that of modified small-pox.

You have had an opportunity of observing the local and general symptoms of inoculated small-pox in an infant, upon whom I deemed it right to practise inoculation at a time when the nurses of our wards were being carried off by an epidemic, and when we had no vaccine virus. This infant, aged twenty-four days, suckled by its mother, was inoculated by means of a puncture on the right arm,

with variolous matter taken from a pustule at the eleventh day of the disease, in a case of modified distinct small-pox. An unsuccessful attempt to inoculate this infant had been previously made with matter from an exceedingly distinct varioloid case. The result of the second operation was to produce on the fourth day a small umbilicated pustule, which, following a regular course, left, on the twenty-first day after its first appearance, a very deep slough. On the eleventh day after inoculation, the seventh from the appearance of the mother-pustule, the infant had the disease in its distinct form, and without any serious constitutional symptoms. The pustules dried up on the seventh day from the setting in of the primary symptoms, such as vomiting and diarrhœa, which began on the ninth day from inoculation. The little patient recovered rapidly, and thenceforth he was safe from small-pox, and even unsusceptible to vaccination. Indeed, on the eighteenth day, we tried in vain to affect him with the vaccine virus, and twenty-five days later we inoculated him with matter from a case of confluent small-pox, which did not even produce the pustule of inoculation. Notwithstanding the complete success of this experiment—a success such as I had formerly obtained elsewhere—I felt that it was my duty to discontinue inoculation, as we had obtained a supply of vaccine virus, and the epidemic of small-pox seemed as if it were on the wane.

LECTURE III.

COW-POX.

Grease of Horses.—Cow-pox in the Cow.—Cow-pox in the Human Subject.—Cow-pox and Horse-pox are Analogous to, but not Identical with, Small-pox: Practical Importance of this Distinction.—Regeneration of Cow-pox.

Gentlemen:—Soon after the middle of last century, when the practice of inoculation had become general in England, a belief prevailed in certain counties that persons who contracted cow-pox from cows were permanently protected from small-pox, whether exposed to its contagion, or inoculated with its virus. Jenner, the inoculator of the district in which he resided, was not unacquainted with this popular tradition. At first he did not believe in it; but he soon became convinced of its truth, having ascertained, upon reliable evidence, that several persons who had twenty-five, thirty, and fifty years previously contracted cow-pox in the dairies of the country had, from the date of that occurrence, escaped small-pox. He was thus led to inquire into the conditions under which cow-pox became developed in the human subject, and to entertain the idea of inoculating with it. His experiments led to results identical with those produced by direct contagion, for the persons to whom he communicated cow-pox remained as insusceptible to variolous influence as those who had had natural small-pox.

Far be it from me to argue that Jenner was not the discoverer of vaccination; for even though he should not be accepted as the first who communicated cow-pox to man by inoculation, there would be nothing to subtract from his glory, since it appears probable that he did not know of the experiments which Benjamin Jesty made in his family. Although there may be involved in this history a question of priority, Jenner had the incontestable merit of having contended

against all the obstacles put in the way of the practice of vaccination, and of having communicated to contemporary physicians the belief which he had deduced from the observation and rigorous interpretation of facts.

Respect, however, for historical verity makes it incumbent upon me to lay before you various documents lately translated in the Gazette Médicale de Lyon, from the Lancet, of London, and which seem to prove that Benjamin Jesty, a Gloucestershire farmer, was the first to inoculate with cow-pox, he having, in 1774, performed the operation upon his wife and two sons, for the purpose of protecting them from small-pox.

The same periodical publishes a note from Mr. John Webb, showing that small-pox may be communicated from man to the cow, and that persons contracting the disease modified by this transmission are proof against variolous contagion. Allow me to translate to you John Webb's narrative, a letter from Mr. Alfred Haviland, surgeon, regarding Benjamin Jesty's discovery of cow-pox, and also an extract, on the same subject, from the records of the Vaccine Institution.

First, then, I will now read to you the narrative of John Webb, which was found among his manuscripts after his death, and is dated in the year 1799. This document was communicated to the Lancet by his grandson, Thomas Watts, and is to the following effect:—

"Some time in the month of May, 1792, having twenty-four children collected together at a house in Doynton for the purpose of being inoculated, and a Betty Bowman, then aged 80, accidentally coming in, she was asked by another woman present whether she had ever had the small-pox; to which Betty replied in the negative, asserting, with a considerable degree of confidence, that she was certain she never should, having in her younger days caught the cow-pox from a cow that was infected by a man in the small-pox. Such an opinion naturally induced me to desire of her a more particular account of the circumstance, when I was informed that, when she was twenty-three or twenty-four years old, she lived in the service of a farmer, on whose estate, at a distance from the farm-house, or any other habitation, there was a small cottage, together with some cowsheds, that the cottage was let to a man (probably one of his labourers) who dying in the small-pox some time betwixt Michaelmas and Christmas, the bed and bed-mat on which he had lain were thrown out into the sheds; that a cow belonging to their

dairy being, as she termed, very chilly, frequently went into the cow-shed, and had been observed to lie down on or near the bed and mat; that shortly after the same cow was seized with the cow-pox, and the whole dairy, consisting of nine cows, sickened one after the other, till at length the milk was so bad that it could not be used, and of course the cows were suffered to go dry, till which time she constantly assisted in milking them; that soon after she was seized with rigors and pains in her limbs, had a tumour form in the right leg and axilla, and that three pustules appeared on the hand near the thumb, from which there was a discharge for some time (she believed about nine days); that, as before mentioned, she neither prior nor subsequent to that period had the small-pox, though she had frequently visited persons ill in it, and once, in particular, lay on a bed on which a person had died in that disease, the bed-clothes only being changed. She likewise observed that two or three persons who had had the small-pox were frequently among the cows, but received no infection. She likewise informed me that she knew a Mary Hathaway, who milked infected cows at one time, and was not infected by them, but that at another time she was; that she likewise never had the small-pox prior or subsequent to that period, though she resided several years in Bristol."[1]

As a sequel to the narrative now quoted, the *Lancet* gives the following statement, by Mr. Alfred Haviland, Surgeon to the Infirmary of Bridgewater. It refers to Mr. Benjamin Jesty, "the proto-martyr of vaccination":—

"At the Rose and Crown Inn, Nether-Stowey, county of Somerset, my attention was drawn, on the 31st of May last, to a photograph taken from a larger portrait of a good specimen of the fine old English yeoman, dressed in knee breeches, extensive double-breasted waistcoat, and no small amount of broad-cloth. He was represented sitting in an easy chair, under the shelter of some wide-spreading tree, with his stick and broad-brimmed hat in his left hand, his ample frame was surmounted by a remarkably good head, with a countenance which at once betokened firmness and superior intelligence."

"I have been thus particular in describing the portrait, for I am not quite certain whether the photograph was taken from a drawing, an engraving, or an oil-painting; if, however, the source was an

[1] LANCET:—13 September, 1862, p. 291. London.

engraving, in all probability there are some copies still extant, which the curious in such matters may think worth collecting. On the back of this photograph is a copy of the epitaph on our subject, as follows:—'Sacred to the memory of Benjamin Jesty, who departed this life on the 16th April, 1816, aged 79 years. He was born at Yetminster, in this county, and was an upright, honest man, *particularly noticed for having been the first person* (*known*) *who introduced cow-pox by inoculation; and who, from his great strength of mind, made an experiment from the cow on his wife and two sons, in the year* 1774.' (From the tomb in the churchyard at Yetminster, Dorset.)

"I am informed by his relative, Mrs. William May (*née* Jesty), that when the fact became known that he had vaccinated his wife and sons, his friends and neighbours, who had hitherto looked up to him with respect on account of his superior intelligence and honorable character, began to regard him as an inhuman brute, who could dare to practise experiments on his family, the sequel of which would be, as they thought, their metamorphosis into horned beasts. Consequently, the worthy farmer was hooted at, reviled, and pelted whenever he attended the markets in his neighbourhood. He remained, however, undaunted, and never failed from this cause to attend to his duties; and the secret of this bold conduct may be traced in his determined chin and nose and firm lips. After living to see another enriched and immortalised for carrying out the same principles for which he had been stoned thirty years before, he died of apoplexy, like Jenner, in 1816. Jesty's experiment on his family was performed in 1774; and *Jenner's on the 14th of May*, 1796, *just twenty-two years later*."[1]

Dr. H. P. Davis, of London, having received from one of Benjamin Jesty's grandsons a copy of the following document, indited and signed by the medical officers of the Original Vaccine-Pock Institution, sent it to the *Lancet*.

"Mr. Benjamin Jesty, farmer, of Downshay, in the Isle of Purbeck, having agreeably to an invitation from the medical establishment of the Original Vaccine-Pock Institution, Broad Street, Golden Square, visited London in August, 1805, to communicate certain facts relating to the cow-pox inoculation, we think it a matter of

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[1] LANCET:—13 September, 1862. London.

justice to himself, and beneficial to the public, to attest that, among other facts, he has afforded decisive evidence of his having vaccinated his wife and two sons—Robert and Benjamin—in the year 1774, who were thereby rendered unsusceptible of the small-pox, as appears from the exposure of all the parties to that disease frequently during the course of thirty-one years; and from the inoculation of the two sons for the small-pox fifteen years ago. That he was led to undertake this novel practice in 1774, to counteract the small-pox at that time prevalent where he then resided, from knowing the common opinion of the county ever since he was a boy, now about sixty years ago, that persons who had gone through the cow-pox naturally —that is, by taking it from cows, were unsusceptible of small-pox; by himself being incapable of taking the small-pox; by having gone through the cow-pox many years before; from having personally known many individuals who, after the cow-pox, could not have the small-pox excited; from believing that the cow-pox was an affection free from danger; and from his opinion that by the cow-pox inoculation he should avoid engrafting various diseases of the human constitution, such as the evil, madness, lues, and many other bad humours, as he called them."

"The remarkably vigorous health of Mr. Jesty, his wife and two sons, now thirty-one years subsequent to the cow-pock, and his own healthy appearance at the time (seventy years of age), afford a singular proof of the harmlessness of that affection. But the public must with particular interest hear that during their late visit to town Mr. Robert Jesty very willingly submitted publicly to inoculation for the small-pox in the most vigorous manner, and that Mr. Jesty also was subjected to the trial of inoculation for the cow-pock after the most efficacious mode, without either of them being infected."

"The circumstances on which Mr. Jesty purposely instituted the vaccine-pock inoculation in his own family, viz., *without any precedent*, but merely from reasoning upon the nature of the affliction among cows, and from knowing its effects in the casual way among men, his exemption from the prevailing popular prejudices, and his disregard of the clamorous reproaches of his neighbours—in our opinion well entitle him to the respect of the public for his superior strength of mind. But further, his conduct in again furnishing such decisive proofs of the permanent anti-variolous efficacy of the cow-pock, on the present discontented state of many families, by

submitting to inoculation, justly clams at least the gratitude of the country."

"As a testimony of our personal regard, and to commemorate so extraordinary a fact as that of preventing small-pox by inoculation for the cow-pock thirty-one years ago, at our request, a three-quarter-length picture of Mr. Jesty is painted by that excellent artist Mr. Sharp, to be preserved at the original Vaccine-Pock Institution."

"G. Pearson, L. Nikol, Thos. Nelson, Physicians.
"— Wheate, F. Forster, Consulting Surgeons.
"J. C. Carpue, J. Doralt, Surgeons.
"F. Rivers, E. A. Brande, P. De Bruge, Visiting Apothecaries.
"J. Heaviside, T. Payne, Treasurers."[1]

Gentlemen, however long you may think these details, you will, in consideration of the interest which they present, pardon me for having laid them before you. I repeat, however, that if Jenner was not the first to inoculate with cow-pox, his was no less the honour of having established the practice of vaccination.

Jenner, in his first publication, which appeared in 1798, while he avoided affirming in too absolute a manner that cow-pox was a complete preservation against small-pox, showed anxiety to make known the nature of his discovery. Experiments, repeated first by Pearson, were afterwards undertaken on a great scale by Woodville, Physician to the London Inoculation Hospital, and ere long the testimony of these physicians, along with that of very many others, was given in favour of Jenner's discovery. Vaccination, in spite of the opposition it encountered, in spite of the violent and unjust attacks to which it was subjected, in spite of the most obstinate resistance and the most absurd prejudices with which it had to contend even in England, soon came to be generally employed. The favorable reception which it immediately received in Hanover extended to the rest of Germany, and, almost simultaneously, to France, where the Duke of Rochefoucault-Liancourt, who during his residence in Great Britain had seen its success, forcibly called the attention of government and the public to this important subject.

[1] Lancet:—25 October, 1862, p. 461. London. The documents in the text are reprinted from the *Lancet;* and are not translations from the French.—Translator.

Cow-pox, that singular malady derived by man from the cow, and then transmitted with wonderful facility from person to person, had ceased to be thought of in relation to its source, and had, so to speak, become forgotten. In the years immediately subsequent to the discovery of vaccination, *picote*[1] is so seldom mentioned by authors, that one may be led to believe that cases of it were then rare, that it occurred seldom, at long intervals only, and in privileged places. In England it had nearly ceased to be a topic of discussion, when, in 1812, attention was called to several cases in the neighbourhood of Berlin. In 1816, it was met with several times in the Duchy of Brunswick. At a later period, however, the occurrence of small-pox in persons who had been vaccinated having suggested the idea that the vaccine virus had degenerated, it was deemed necessary to go back to the fountain-head, or, in other words, to search for cow-pox in the cow. The investigation began in Germany, where, at the commencement of the inquiry, it was established that the *picote* of cows was by no means so rare as might be inferred from the long silence which had existed regarding it. In Holstein, irrespective of isolated cases, it had prevailed as an epizootia five times in eleven years. The attention of Government having been awakened, orders were issued in 1826, 1829, 1830, and 1831, to search for vaccine matter in the cow. Prizes were offered to the proprietors of cows affected with the disease, aud from that time cases multiplied in Würtemberg and the Duchy of Baden.

In 1836 a commission was appointed by the Academy of Medicine of Paris, to examine into a case at Passy, near Paris. A lady of the name of Fleury, residing at Passy, having stated to Dr. Perdreau, of Chaillot, that her cow, affected with *picote*, had communicated the affection to her hand, MM. Bousquet, Emery, and Gérardin, were commissioned to study the case; and the result was that they obtained characteristic cow-pox by inoculating the arm of a child with matter taken from Madame Fleury's hand.[2]

When these inquiries were going on in Europe, Dr. Macpherson,

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[1] The word *picote* in the text evidently refers to the vaccine disease in the cow, but in some districts of France, *picote* is the current name of small-pox in the human subject; and wherever French is spoken, a man marked with small-pox is said to be *picoté*.—TRANSLATOR.

[2] Sur le Cow-pox découvert à Passy près Paris, le 22 Mars, 1836.—*Mémoires de l'Académie de Médecine*, t. v, p. 600.

in 1833, published his experiments on vaccination, and announced that he had seen in the neighbourhood of Calcutta, in India, an epizootia of tag-sore. He found that this affection could not only be communicated by inoculation from cow to cow, but also from the cow to man, and afterwards from man to man.

Observers were struck with the remarkable fact that transmission took place more readily when the virus was humanised, or, in other words, when it had been transmitted from man to man. The action was more powerful than that produced by inoculating the human subject direct from the cow. Dr. Steinbrenner has recorded a remarkable example of this peculiarity, which I shall now quote exactly from his Treatise on Vaccination.

"On the 18th May, 1845, a proprietor informed me that one of his cows had an eruption on the udder and teats. Upon examining the cow, and comparing what I saw with the descriptions of authors, I became nearly certain that I had at last found *picote;* and although the eruption was too far advanced to justify the hope of obtaining very efficacious virus, I lost no time in collecting a considerable quantity on four plates of glass. About an hour afterwards I inoculated, by sixteen punctures, two unvaccinated children. Only one of the sixteen punctures produced a vaccinal pustule; but it was a very beautiful and large one, which passed through the different stages in the most perfectly, regular manner. On the eighth day, two children were vaccinated from this pustule, the virus beiug transferred direct from arm to arm; and this time the sixteen inoculatory punctures produced sixteen beautiful vaccinal pustules. Since that occurrence I have only vaccinated with lymph derived from that source, and have obtained precisely similar results. I sent supplies of lymph taken from my first cases to the Academy of Medicine of Paris, through M. Bousquet; to the Medical Society of Strasburg; and to many brother physicians, particularly to the cantonal physician of Saar-Union; and to Drs. Foderé, Kuntz, Clausing, &c. Everywhere it produced a very beautiful vaccine pock, yielding lymph, which was at once substituted for that formerly in use.

Similar results have been more recently obtained by physicians and veterinary practitioners in the department of Eure-et-Loir, by whom cow-pox in the cow was also found. Similar results are

[1] Steinbrenner:—Traité de la Vaccine, p. 534.

observed in the vaccinations—particularly in the revaccinations—now taking place in our hospitals, with vaccinal lymph derived from the heifers of Dr. Lanoix. That lymph gives rise to vaccinal pustules much less frequently than that taken from the arm of a child. With reference to this point, I would remark, that the lymph obtained from the heifers of Dr. Lanoix is not primitive lymph, and therefore is not more active than that taken from the human subject; and, moreover, it is the virus of cow-pox modified and weakened by a considerable series of successive generations. It appears to me that it has lost much of its power in passing successively from heifer to heifer. Whatever theory we adopt, the fact remains, that vaccine lymph taken direct from the heifers referred to is less active than that which has been taken from man—than that which has been humanised.

I must not allow this opportunity to escape without explaining to you the characteristics of cow-pox in the cow; as it is of the greatest importance for physicians, especially for those practising in country places, where the supply of vaccine lymph may fail, to be able to recognise the affection. The eruption consists in pustules on the udder and teats of the affected animal, having a great resemblance to those which we lately saw on the face of a small-pox patient who lay in bed No. 11 *ter* of St. Agnes's Ward, whose case I have already brought under your notice, as presenting a remarkable example of the inoculation-pustule. The cow-pox pustules are at first pimples, varying in size from that of a lentil to that of a common round bean. They become more and more elevated; on the second or third day from their first appearance, they acquire a pustular character, are filled with a colourless lymph, and are depressed in the centre. Toward their centre, these pustules are of a bluish-white, livid colour, and towards their periphery, where an areola has already formed, they are reddish or yellowish white; they then resemble the pustules produced by variolous inoculation. In other cases, they are of a silvery hue, of a pale red, a reddish yellow, or a clear yellow. This difference in the colour of the pustules is dependent upon their degree of development, and also, to a certain extent, upon the natural tint of the udder. On the following days they become larger, and often attain the size of a half-franc piece; and in these rare cases they are also more numerous, the udder and teats sometimes presenting from eight to twenty pustules, which reach their maximum development on the ninth or tenth day; at this period also, the

areola which, since the formation of the pustule, has formed a narrow ring, becomes more extended, but in cows with brown or black udders the areola is scarcely visible. Hardness, swelling, increased heat of skin, and sometimes very great tenderness, are then perceptible. There is at the same time an exacerbation of the general symptoms, such as distaste for food, restlessness, and fever. The milk both deteriorates in quality and diminishes in quantity, and its secretion is altogether arrested when the eruption is very abundant, and accompanied by an excess of reaction. Immediately after the ninth day, crusts form in the centre of the pustules, while at their periphery the lymph grows thicker and thicker, till at last it becomes converted into a cheesy pus. The crusts, if not previously torn off, fall between the eighteenth and twenty-fourth day, leaving in their place ulcerations, which in some cases eat so deeply into the tissues as to detach the teats. In other cases, inflammatory swellings and abscesses of the mamma supervene, which continue for three or four months.

As I have broached the history of cow-pox, allow me, gentlemen, to say a few words upon questions connected with that subject. First of all: What is the origin of cow-pox? Considering the immunity from small-pox which cow-pox confers on the human race, it has been asked whether cow-pox is not in point of fact human small-pox modified by transmission to the cow, just as cow-pox is modified by transmission from the cow to man? It has also been asked whether cow-pox is not a distinct disease, peculiar to the animals in which it is observed? And, finally, it has been asked, whether it does not originate in a disease peculiar to other kinds of animals, and which is not small-pox?

Jenner, adopting the opinion generally received in his own country, regarded cow-pox as originating in a disease peculiar to horses termed *grease* in England and *eaux aux jambes* in France. The illustrious discoverer of vaccination had remarked a fact, well-known also to the farmers and peasantry, that cow-pox was met with only in the dairies where the cows were attended to and fed by men who likewise had charge of horses. Whenever grease was observed in stables, cow-pox soon showed itself in the cow-houses, whither it was brought by the men-servants of the farm who came to milk the cows with hands soiled by pus from horses affected with grease. In dairies, where women only were employed, as in Ireland, cow-pox was very rare. Although the proposition of Jenner cannot be

accepted as absolute, experiments have proved that there is an analogy between, if not an identity in, the two maladies. It is one thing, however, to admit that grease may be transmitted from the horse to the cow, and then produce true cow-pox, and another to maintain that the only source of cow-pox in cows is grease in horses.

A recent case has once more demonstrated the identity of the two diseases. Early in March, 1856, Dr. Pichot of La Loupe, a physician of the department of Eure-et-Loir, was consulted professionally by a farrier's assistant; this individual had on the back of both hands pustules which were opaline, confluent, of about a centimeter in diameter, and depressed in the centre, where a small linear crust was visible. They had exactly the appearance of vaccinal pustules of the eighth or ninth day. The man, who had never been vaccinated, affirmed that he had not been in contact with a diseased cow, but he recollected that twenty-four days previously he had shod a horse affected with grease. The horse in question belonged to a farmer. The veterinary practitioner at La Loupe, a distinguished pupil of the schools of Alfort and Toulouse, verified the disease, which still existed when he examined the horse. Dr. Pichot immediately collected, between glass plates, fluid from the pustules, and sent some of it to Dr. Maunoury of Chartres.

Without waiting to hear the result of Dr. Maunoury's experiments, Dr. Pichot tried to vaccinate his patient. The operation produced no characteristic effect, although the lymph used was taken from the arm of a child, from which at the same time two other children were vaccinated, in both of whom the true vaccinal pock appeared. These were visible on the sixth day from the operation, in the situation of the six punctures made on the man's arm, only two small rounded pustules, which were partially covered with a crust, and bore no resemblance to the pustules on the arms of the children. An attempt was made to inoculate another child with liquid from these two pustules; but on the eighth day no result whatever had taken place. On that day, the same child was vaccinated with ordinary vaccine lymph, and in seven days he exhibited four superb vaccine pocks, from which three other children were successfully vaccinated.

Dr. Maunoury inoculated a child with the matter sent to him by Dr. Pichot, making five punctures, viz., three on the right and two on the left arm. The result was the appearance, on the eighth day, on the right arm, of one beautiful clear pock, as large as a lentil,

filled with yellowish serosity, and surrounded by a reddish circle of about a centimeter in diameter. Dr. Maunoury vaccinated several subjects from this pustule. Three children were inoculated with pus taken from it, and all three were found to be perfectly vaccinated. A fifth child was vaccinated with lymph taken from one of the three, and the lymph in this its third generation was proved to be efficacious; it was found to be equally efficacious in a fourth and fifth generation. It is evident, therefore, that it was true vaccine matter which was communicated to the first patient by the horse affected with grease which he had shod. In this history, accordingly, we find a confirmation of Jenner's opinion.

Jenner, however, notwithstanding the soundness of his theory, was never able to produce more than a simple inflammation in those whom he inoculated with matter taken from horses affected with grease; but then it must be remembered, that he always used pus from the old ulcerations, and never the clear lymph of the recent pock. After his time, the same facts, confirmed at a later period by Drs. Pichot and Maunoury, were irrefragably established by experimentalists. In 1801, Dr. Loy published an account of his experiments on the origin of cow-pox, in which he mentioned that he had inoculated men as well as cows with matter taken from horses affected with grease. Dr. Loy having observed on the hands of two persons, a farrier and a butcher residing in Yorkshire, a pustular eruption much resembling cow-pox and accompanied with great constitutional disturbance, inquired into the circumstances and found that one of these individuals, for some time previously, had had charge of horses suffering from grease. He took lymph from this person and with it inoculated his brother and another child; in both cases this inoculation produced pustules exactly similar to those of true cow-pox, both in respect of their appearance and the course they ran. With the same lymph with which he inoculated the two children, he inoculated a cow, producing thereby a very beautiful cow-pock, which was accompanied by all the accessory phenomena. From that pock he inoculated a child in whom, in due course, a beautiful cow-pock appeared; this child was ascertained to be proof against small-pox, for on the sixth day after the vaccinal inoculation, variolous inoculation was performed without causing any subsequent result. It will be seen that the observations of Dr. Loy bear a great analogy to those made at a later date by Drs. Pichot and Maunoury.

But, at first, Dr. Loy failed in his attempts to inoculate cows with matter taken from horses affected with grease. He repeated his experiments several times without success, using matter taken from other horses; he was also at first equally unsuccessful in his attempts to inoculate man from the horse. At last, he succeeded in finding a horse in which the grease had existed for only fifteen days; the cases from which till then he had obtained his matter were of older standing. With matter derived from this recent case, he inoculated five cows, and in all of them cow-pox was the result. From these cows he obtained lymph with which he produced cow-pox in children, whom he subsequently found to be proof against variolous inoculation.[1]

Sacco, of Naples, who had at first unsuccessfully inoculated twenty-seven cows and eight children with lymph taken from grease in horses, observed pustules on the hands of persons who had charge of horses affected with the disease; with fluid from these pustules, he inoculated nine children and one cow; in two of the children he produced normal cow-pox, a result exactly similar to that formerly noticed as having been obtained by the physicians of the department of Eure-et-Loir.

Finally, in 1805, Viborg, a Danish veterinary practitioner, inoculated the udders of cows with grease-matter, taken from horses, and after several failures obtained the desired result, viz., a characteristic, well-developed eruption of cow-pox on the fifth and sixth days after inoculation. Other observers, among whom may be mentioned Professor Ritter, of Kiel, have reported cases of cow-pox following inoculation with grease-matter, and yielding a perfectly efficacious vaccine lymph.

To these statements I may add facts observed in the spring of 1860, by MM. Sarrans, of Rieumes, and Lafosse, of Toulouse. During an epizoötia among horses, a man was attacked with swelling of the hamstrings, whence issued a sanious discharge. M. Lafosse charged a lancet with this exudation, and then therewith inoculated in succession two young cows; in both, pustules appeared, presenting all the characters of cow-pox. With matter taken from these pustules he reproduced vaccine lymph, with all its characteristics and properties.

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[1] Steinbrenner:—op. cit., p. 608; and Loy's Account of Some Experiments on the Origin of Cow-pox. 8vo. Whitby, 1801.

Hitherto I have spoken of grease [*eaux aux jambes*], employing a term in common use; but, in point of fact, observers have not yet made out the exact nature of the disease of the horse, which, when transmitted to the cow by inoculation, gives rise to cow-pox. In a discussion at the Academy of Medicine,[1] and afterwards at the Biological Society in 1861, Mr. H. Bouley pointed out at great length that veterinaries were much divided in opinion as to the exact nature of the disease which goes by the name of *eaux aux jambes*. M. Leblanc, who went to Toulouse to study the disease in the mare which had supplied M. Lafosse with new vaccine lymph, proved that this mare had not the disease called *eaux aux jambes*, but all the veterinaries who observed the epizoötia at Rieumes were agreed that it presented all the characters of an epidemic eruptive fever. It is not within my province to give a name to a disease of horses which has already received a name from veterinary physicians. Can we, looking at it as an eruptive fever, compare it with the tag-sore [*clavelée*] of sheep? Can there exist in the horse an eruptive fever, which, when communicated to man by direct or indirect inoculation, yields a virus which either is vaccine virus or is analogous to it in its properties? These are questions which we may at present ask, but it will only be in the future that they can be answered.

Alongside of the experiments conclusively in favour of the transmission of the disease from horses to the cow and human species, others of an opposite tendency are cited. In France, attempts, made at Alfort and Rambouillet, to inoculate cows with cow-pox, by using grease-matter, were not till recently attended with success, but then inoculation of children with matter from the horse-disease was not tried. In explanation of these negative results, it has been urged that possibly the cows which resisted the inoculation by grease-matter from horses had had cow-pox at some former period; and also that the malady is not inoculable at all its stages, and that it cannot be communicated by punctures made anywhere. Finally, as was alleged by Dr. Loy, there are evidently several different diseases which have been confounded together under the name of grease, only one of which is the true disease capable of being transmitted to the cow, and transformed in the cow into cow-pox, and

[1] Bulletin de l'Académie de Médecine; 1861-62, t. xxvii, p. 854—880.

in the human subject into vaccina. The researches of M. H. Bouley have corroborated this opinion of Dr. Loy. Jenner does not seem to have been acquainted in an exact manner with the disease of horses which, when transmitted to cows, produced cow-pox; he gave it the vague name of "sore-heels," which means disease of the heels. To the "sore-heels" of Jenner, the "javart" of Sacco, the "affection furonculeuse" of Hertwig," the "maladie pustuleuse" of M. Lafosse—of all of which it has been said, and of some of which it has been demonstrated, that they produce cow-pox by inoculation—to these affections M. H. Bouley has just added aphthous stomatitis. M. Depaul, however, has shown that what was supposed to be merely an aphthous affection of the mouth was a general pustular eruption very analogous to small-pox. In other words, it was *horse-pox*, the malady which gives cow-pox to cows. But the distinctive characters of horse-pox have not as yet been accurately determined, and it is still a disease without an historian.

There are numerous examples in human pathology of inoculable diseases not inoculable at all their stages, and also of diseases which can be set up more easily by introducing the virus at one part of the body than at another. We know that syphilis can be easily introduced into the system by making a puncture, and inoculating with pus taken from a chancre; and we also know that generally syphilis cannot be inoculated by using matter from a pustule or muculent scab of ecthyma syphilitica. Some physicians, wrongly, however, deny that it is ever possible to effect this last-mentioned kind of inoculation. It is now beyond dispute, that in certain exceptional circumstances syphilis can be inoculated from secondary forms of the disease. When we return to this question in treating of syphilis in new-born children, we shall see that the disease is transmitted from infant to nurse only under very special conditions.

These conditions chiefly consist in frequent and long-continued contact of the syphilitic virus of the affected parts of the infant with the absorbing surface in the nurse. They are most favorable when the infant sucks with power and energy, and when the nipple is in a state of continuous and increasing erection from the time that it is touched by the lips of the infant. The excitation of the nipple imparts to it an anatomical and physiological state, in virtue of which the skin covering it, in obedience to the laws of endosmosis, opens a

door for the absorption of the contagium, so that there is required neither denuded surface, excoriation, nor fissure of the nipple, the more usual way by which syphilis enters the system of the nurse from that of the nursling. If, then, we compare what takes place in respect of the transmission of syphilis and grease in their more advanced forms, we can understand the unsuccessful attempts which have been made to inoculate the latter, and can explain the negative experiments made at Alfort and Rambouillet, as well as other negative experiments, by supposing that the virus was taken at a period when it had lost its energy through the too great length of time which had elapsed since the primary development of the disease. Is it possible otherwise to explain the positive results obtained by learned and conscientious observers, such as Loy, Sacco, Viborg, Ritter, Berndt, Pichot, and Manoury?

From this brief statement of facts, I conclude with Steinbrenner, whose opinion is also that of Woodville, Coleman, Viborg, Sacco and others, that cow-pox may originate in grease: but here I must repeat a proposition I have already carefully established, that this is not equivalent to saying that cow-pox has an exclusive origin in inoculation or in contact with the disease of horses: indeed, cow-pox generally arises quite independently of grease.

Although grease is undoubtedly transmissible from horse to cow and from horse to man, it loses much of its likeness to itself by transmission: and cow-pox in the cow has not a greater resemblance to grease than vaccinia (or humanised cow-pox) has to cow-pox in the cow. These modifications in the form of affections, which are essentially and fundamentally identical, depend on the nature of the organisms in which they are developed; and similar modifications are not rare in comparative pathology.

For example, malignant carbuncle [*sang de rate*], a disease peculiar to the ovine species, becomes quarter-evil [*charbon*] in horned cattle, and malignant pustule [*pustule maligne*] in man.

This typhic, strange, general disease, frequently destroys a great number of wool-clad animals in certain countries of Europe, particularly in the departments of France which constitute the old provinces of Beauce, Berry, and Bric. It can be transmitted to sheep, by inoculating them with the blood of an infected sheep. If a little blood, taken from the spleen immediately after the animal has been killed and before putrefaction has begun, be introduced by inoculation into the ear, groin, or inguinal region of another sheep,

there is no indication of any effect having been produced, till from twenty-six to thirty-six hours have elapsed: the animal then, all at once, loses appetite, shows typhic symptoms and, within an hour or two, dies. On dissection, lesions similar to those found in the sheep from which the blood used for the inoculation was taken, are observed. On inoculating with blood taken from the second sheep, a third in a district far away from that of the other two, the malady is communicated; and it can in succession be similarly transmitted to individuals of the same species, the disease always remaining the same, and identical in its symptoms.

If, however, you inoculate an ox or a cow with blood from the spleen of an infected sheep, you no longer produce the ovine malignant carbuncle [*sang de rate*], but a kind of *charbon* which, though at first only a local affection, will soon become a general disease attended by grave symptoms, quickly proving fatal, unless it be eradicated in its original site by energetic cauterization.

Again:—A shepherd, when skinning a sheep which had died from *sang de rate*, was inoculated with the disease, either by his excoriated hands having been soiled with the animal's blood, or by his hands, perhaps quite free from excoriations, having remained too long in contact with its hide. After a certain time, a disease of special character was developed in this man: which, although *sang de rate* is from the onset a general malady, was at first exclusively local: it was the affection called malignant pustule. This malignant pustule, which is really a small vesicle, occasions tingling in the skin for a day or two, soon followed by a feeling of numbness extending along the arm, if the pustule is situated on the hand or fore-arm: soon after this, there appears in the centre of the little vesicle a gangrenous speck, which resists the point of the bistoury, while at the same time general disturbance of the system supervenes and the patients sink under ataxo-adynamic symptoms, lasting sometimes for five or six days. Malignant pustule is at first so purely a local affection that its constitutional development may be prevented and the patients saved by adopting the treatment now generally followed in Beauce, which consists in vigorous cauterization, effected more particularly by applying corrosive sublimate to the parts previously deeply scarified. The physicians of the department of Eure-et-Loir, as well as those of Perche and Berry, are well acquainted with this treatment, and when called in to a case promptly, that is to say sufficiently early to cut short the progress of the disease, they have little anxiety

about the issue. I am myself in a position to form an opinion on this question. In 1856, one of my country servants contracted the disease when handling three sheep which had died of the *sang de rate*. One Sunday, just as I came home, this man showed me his hand, on which I saw a very characteristic malignant pustule: the beginning of the malady dated back to the previous Wednesday: there was already some feverishness and general constitutional disturbance. I scarified the affected part and introduced corrosive sublimate into the wound: in forty-eight hours the cure was ascertained: on the following Sunday, I found my patient in perfect health, excepting that he had a painful scab on his hand.

When we see a disease undergo such remarkable mutations by transmission from an animal of one species to an animal of another species; when we see different organisms respond in so different a manner to the same morbific cause, it ought not to be looked on as astonishing that grease should also change its form when transmitted to the human subject or the cow; nor need it any more be considered wonderful that there is so little resemblance between cow-pox in the cow and vaccinia, although the nature of both is the same. We can in the same way understand how the further question may be asked —whether cow-pox is anything else than human small-pox modified by development in the organism of the cow, so as to lose its original qualities, and be re-transmissible to man with its behaviour wholly changed. Let us pause a moment to consider what has been done to elucidate this question so full of interest.

Many attempts had been made to produce cow-pox in cows by inoculating them with virus of small-pox from the human subject, but without causing anything like cow-pox, although the experiments were made in various ways, and upon animals of different ages, till 1807, when Dr. Gassner of Günzburg announced, that he had obtained the desired result. He inoculated eleven cows with small-pox virus, and obtained true cow-pox from them, with the matter of which he inoculated children in whom real vaccinia was thereby produced. These results were called in question; but in 1839 Dr. Thielé of Kasan, having repeated the experiments of Gassner, stated that after having tried ineffectually to inoculate the cow both with vaccine lymph and small-pox matter from man, he at last succeeded with the latter, cow-pox pustules being produced in the cow: with matter taken from these pustules, he obtained normal vaccinia in children. These experiments date back to 1836,

from which time Dr. Thielé continued to vaccinate with the same lymph; and when he wrote, it had passed through seventy-five generations, and had demonstrated its efficacy in more than 3000 persons. More recently, to put this efficacy to the test, he inoculated with small-pox twenty-one of those he had vaccinated, and without causing small-pox in any of them. The cows upon which Dr. Thielé made his experiments were between four and six years old, newly calved, and were, as often as he could find them, cows with white teats. He confined them to their shed, keeping the temperature there at 15° Réaumur: their food was not in any way altered; and they continued to be milked. The place selected was shaved immediately before inoculating; and the place selected was the posterior surface of the udder, so that the cow was unable to lick it. Punctures were there made, a little deeper than is usual in vaccinating the human subject, and were covered with a linen cloth soaked in the matter. The matter was taken from small-pox pustules, nacreous, and bead-like, before they had lost their transparency, and containing very clear lymph: that he might proceed with still greater certainty, Dr. Thielé kept the lymph for ten or twelve days between glass plates before using it. On the third day after inoculation, a protuberance was formed under the skin; on the fifth, a pock like the vaccinal pock was visible, which, between the seventh and ninth, contained a limpid lymph and presented a central depression. Between the ninth and eleventh day, this pock began to desiccate and to form a crust which, when it fell off, left a small smooth cicatrix. Dr. Thielé generally obtained one or two pocks from about three or six inoculated punctures.

In 1840, Dr. Ritter of Munich announced that he also had inoculated cows with small-pox. He stated that during ten years he had experimented on more than fifty cows without the least success, but that at last, having adopted Dr. Thielé's plan, he obtained his results. He produced cow-pox in the cow, whence he derived matter which gave children a perfectly normal vaccinia.

Concurrently with the publication of the result of Dr. Thielé's experiments, Dr. Ceely of Aylesbury met with similar success. I shall not relate the details of his experiments, which you will find *in extenso* in Dr. Steinbrenner's remarkable work.

Dr. Sunderland of Barmen also tried to get cow-pox by inoculating the cow with small-pox, but he proceeded in a different manner from Drs. Thielé and Ritter. Dr. Sunderland, in *Hufe-*

land's Journal for 1830, has described the plan which he adopted, which consisted in covering cows with a woollen blanket taken from the bedding of a man who had died in the suppurative stage of a severe case of small-pox. The blanket was immediately taken from the dead man's bed, rolled up in a sheet, and carried to a shed where there were young cows: it was carefully fixed successively on the backs of the animals, and allowed to remain on each for twenty-four hours. Not only did each of the cows wear the blanket for twenty-four hours, but it was after that fixed along their manger, so that they could not avoid breathing the miasmata which it exhaled. After some days the cows ceased eating, drank a great deal, and had fever: about the fourth or fifth day, pustules appeared upon the udder and other soft parts. These pustules followed the usual course of cow-pox, and between their fourth and eighth day they yielded lymph which served for vaccination.

This marvellous discovery could not fail to command attention: eagerness was shown to repeat Dr. Sunderland's experiments. The results which he announced had been nowhere obtained, neither in Denmark where, in 1833, the Government requested physicians to investigate the subject, nor at Berlin, Weimar, Dresden, nor Calcutta. In France, the success was no greater. M. Miquel of Amboise made several fruitless attempts to inoculate the cow with a view to produce cow-pox from the virus of small-pox. Our learned brother of Touraine, however, experimented under apparently the most favourable conditions. Those who have visited the banks of the Loire between Blois and Angers must have seen dwellings excavated in the rocky slopes wherein herds of peasants live crowded together, and only separated from their cattle by slight partitions. Well! M. Miquel had occasion to see an epidemic of confluent small-pox prevailing amid that population. It being winter, the cows were shut up in their sheds day and night, so that they actually lived among the sick people. Still, under these circumstances M. Miquel was unable to find small-pox among the cows: he wrapped them up in the blankets of the sick people, but was not able in a single cow to detect the most minute cow-pock. The plan of Dr. Sunderland, then, only yielded satisfactory results when put in force by himself, unless we take into account circumstances mentioned in the narrative of John Webb which I quoted from the London *Lancet*, and which certainly corroborate the experiments of the physician of Barmen.

M. Depaul has recently supported the proposition that small-pox and cow-pox are identical, and that cow-pox is human small-pox transmitted to, and modified by the cow, or in other words, that it is nothing more than mitigated small-pox. An epidemic of small-pox would in his opinion be sufficient to explain, on the principle of contagion, the development of that disease in horses, and the inoculation of the cow with horse-pox would in all probability give rise to a modified form of small-pox—that is to cow-pox. He says:—"Cow-pox when transmitted to man will reproduce itself with its characteristics," that is, with its vaccinal characteristics; and finally, that "tag-sore [*clavelée*] is nothing more than small-pox in the sheep, and is probably the same as small-pox in the horse," whence, he adds, "it follows that the true secret for mitigating small-pox in the human race consists in causing the disease to pass through another species of animal and in then communicating it to man by inoculation."[1]

I have quoted the opinions of my learned colleague in his own words—opinions which he supported by experiments which seemed, for the moment, to prove that his views were right. In point of fact, small-pox can be transmitted by inoculation to oxen and horses: the inoculation originates in them a pustular affection *analogous* to cow-pox, but only analogous, for the disease imparted to them is really small-pox. This question ought to be considered as definitely settled by the experiments of a commission appointed by the Society of the Medical Sciences at Lyons.

As we have here to do with a doctrine in which theory is intimately associated with practice, and regarding which the holding of unsound conclusions may lead to and, as you shall see, has led to irreparable mischiefs, I ask you to allow me to read to you some of the salient passages of the report made by M. Chauveau in the name of the Lyons Commission.

The learned reporter has first shown that small-pox can be perfectly well communicated to the bovine species by inoculation, to which species it stands in the same relation as vaccinia to man; that is to say, that when an ox is inoculated with small-pox it is thereby made proof against cow-pox, just as a vaccinated man is proof against small-pox. But a much more important practical point is, that "*small-pox in its passage through the system of a cow is not transformed into vaccinia: it remains small-pox, and returns to the*

[1] Depaul:—Bulletin de l'Académie de Médecine, 1863-64, t. xxviii.

original state of small-pox when re-introduced into the human species." The experiments of the Lyons Commission upon solipeds gave results similar to those obtained from bovine ruminants. There is only a difference in form. Thus in the cow, the eruption of small-pox consists of pimples so minute as to escape notice unless one is on the outlook for them. Cow-pox, on the other hand, engenders an eruption of the vaccinal type with its large and very characteristic pocks. In the horse, also, the inoculation of small-pox engenders a papular eruption in which there is neither secretion nor crust; and although this eruption is much more formidable than that produced in the cow, it need never be confounded with horse-pox eruption, so remarkable for the abundance of the secretion and the thickness of the crusts. Hence it follows, that small-pox and cow-pox, or horse-pox, are different diseases, and that when we vaccinate after the method of Thielé and Ceely we in reality inoculate small-pox.

This kind of inoculation of small-pox may possibly be free from danger, the disease being—according to hypothesis—modified in its passage through the cow or horse. Some even believe in a mixed virus, to which the epithet *vaccino-variolic* has been given. Experiment, however, utterly demolishes this theory. Here, again, we are indebted to M. Chauveau for demonstrative evidence. The facts are as follow:—A girl of two and a half years of age was inoculated with the so-called vaccino-variolic virus—that is to say, with matter taken from pustules in a cow which had been inoculated with small-pox. This child had, on each arm, three magnificent primitive pustules, and at a later period, a disseminated eruption of about fifteen pimples. The pustules on the arm furnished virus with which two very healthy children were inoculated. "On the tenth day, both took simultaneously very severe general small-pox: the eruption was as confluent as it was possible to be, the fever was very intense, and there were convulsions and vomiting. One of these two children died from the severity of the attack." But this is not all: another child was inoculated with the vaccino-variolic virus taken direct from the cow: on the eleventh day, there was a well-marked local eruption, and three days later confluent small-pox, which for several days placed the life of the child in imminent jeopardy. Finally, in this case there were indelible variolic cicatrices. Here, inoculation only disfigured the child: but I have now to mention another case in which it was a homicidal act. The virus

was taken from the horse: the inoculated child had an anomalous form of small-pox, from which it died. Influenced by highly commendable prudential motives, M. Chauveau does not give more circumstantial details of this case, but the details which he furnishes are quite sufficient.

By the evidence now adduced, I hold that the question is definitively settled. Both in France and foreign countries, however, successful and unsuccessful experiments may be quoted. Bretonneau in his experiments, which he repeated several times, never obtained any result when he operated on heifers, to which he gave the preference from not wishing to dry up the milk of nursing cows. But other experimentalists were more fortunate. Drs. Haussmann of Stuttgard, Numann, Billing, professor of the veterinary school of Stockholm, Magliari of Naples, Heim of Meschede; Drs. Zybel, Nicolai, and Leutin; MM. With, professor at the veterinary school of Copenhagen, Prinz of Dresden, &c.; lastly, Dr. Bousquet, Member of the Academy of Medicine, who has paid much attention to the subject of cow-pox,[1] Dr. Steinbrenner, MM. Boutet, Maunoury of Chartres, have produced true cow-pox by vaccinating cows with the human vaccine lymph with which they were vaccinating infants.

When confronted with these contradictory facts, we are obliged to ask:—What is the explanation of the successes and failures? The solution of the problem is not devoid of difficulty. Must we, to explain the diversity of results, invoke assistance from the question of morbid susceptibility—*opportunité morbide?* Let us take an example. I assume that some particular disease—say influenza—is prevailing. One individual, living in the midst of the epidemic, is seized with influenza under influence of the slightest cause, while another escapes who is living close to the first, and exposed to the same morbific causes, as well as to others more powerful. During the whole of the course of the epidemic, this individual may be exposed with impunity, and then, at some future time, take influenza without any appreciable cause. There are times when an individual is proof against morbific influences, in virtue of I know not what, in virtue of a special condition, of a peculiar state of the organism; but whenever this special state ceases, the same organism is easily affected by the smallest of the influences which it formerly resisted.

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[1] Bousquet:—Nouveau Traité de la Vaccine et des Eruptions Varioeuses. Paris, 1848.

Is it to special states of the organism we ought to look for the explanation of the different results which have followed vaccination of the cow? Or ought we to call in question the virus employed in the experiments? Shall we say with Steinbrenner, that the total absence of results observed at a certain period after the early days of the Jennerian discovery, in which successful were in excess of unsuccessful cases, depended on the lymph having in its descent become much weakened in power? The observations of Fiard and those of Boutet and Manoury seem to give support to that view: the inoculations of cows which they made with matter of old descent never succeeded, but when they used the matter regenerated in their experiments, they obtained a pock from which they were enabled advantageously to vaccinate children. With Steinbrenner we further ask whether vaccinal matter in its first generation in the cow produces more than local results, and whether, after successive generations in animals, it does not gradually acquire the properties of cow-pox such as they were found by Jenner?

Transmission of Cow-pox from Man to Man.—Circumstances favourable to Successful Vaccination.—The Lymph ought to be taken between the Fifth and Seventh Days.—Selection of Subjects from whom the Lymph ought to be taken.—Health of Persons who are to be Vaccinated.—Transmission of Syphilis in Vaccination.—Vaccinal Eruptions.

Whatever explanation, gentlemen, may be given of the facts which I have now laid before you, it is very remarkable that cow-pox when first introduced had a much greater activity than it manifests in the present day. Jenner foresaw this degeneration: he foresaw it, because he suspected that the virus would lose its power in successive transmissions, and also because he reckoned on the shortcomings of vaccinators. The first proposition is to a certain extent established by what I have already told you of the enfeebling of cow-pox in the bovine species itself, which took place by transmission from heifer to heifer. What I am about to say of the manner in which vaccination is too often performed will prove the second proposition. Forgetful of the rules laid down by Jenner, vaccinators in place of taking lymph before the eighth day, and by preference on the fifth, waited till the eighth day: that was the general practice, but some physicians did not scruple to use

lymph taken even as late as the ninth day. Moreover, no attention was paid as to whether the individual to be vaccinated was or was not in a favourable state for the development of cow-pox. This state of fitness, however, is a consideration of the highest importance, and the frequency with which it has been neglected is the reason why we have to deplore many disappointments in the present day.

Let us, then, study the conditions necessary for the reproduction of a vaccine lymph, which will retain its anti-variolous power to the greatest possible extent, and be transmissible from age to age. Jenner pointed out these conditions: Dr. Truchetet has re-stated them in his inaugural thesis, basing his conclusions upon experiments which he made in my clinical wards.[1] Some of these conditions pertain to the virus, others to the subject into whose system it is introduced. If the virus has degenerated, it is, as Steinbrenner says, because the lymph employed has been taken indiscriminately from any individual provided the pocks were normal, no inquiry being made as to the beauty of the pock, its progressive development, or its age. Upon reflection, however, it is evident, that, as the laws of biology are equally applicable to the life of animals and plants, physicians ought always to act in this matter upon principles similar to those which influence the selection of seed by agriculturists, who know that by sowing their fields with the finest grain, they will in return reap from them grain of the finest quality. And, without leaving the domain of pathological biology, it is a well-known fact that after a certain period in the development of the pustule, the variolous virus is inert. In 1784, Earle an English physician, communicated his observations on this subject to Jenner, stating that when he had inoculated with matter from too advanced small-pox pustules no effect was produced.

The selection of vaccinal lymph is, therefore, a matter of great importance. Its activity is far from being the same at all its ages. Twenty-four or thirty hours after introduction, it is powerless; in from forty-eight to seventy-two hours, it has begun to develope power; and on the fourth, fifth and sixth days, it possesses its maximum energy; on the seventh day, it has decreased in power, and after from the eleventh to the fourteenth, it is absolutely powerless.

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[1] Truchetet:—Quelques Recherches sur la Vaccine. [Thèses de Paris, 1855.]

Jenner, who at first employed lymph taken on the eighth day, then believed that that was the most favourable time, but he afterwards discovered that on and after the fifth day, the pock contained a lymph perfectly inoculable and of great energy: he said that this energy diminishes from the time that the inflammatory areola begins to appear: and not only did he abstain from employing lymph taken after the eighth day, when he could do otherwise, but he preferred to obtain it on the fifth. This was likewise the opinion of Delaroque, the French translator of the English physician's work; it is the opinion of a certain number of the most notable practitioners; it is Dr. Bousquet's opinion; and it is also mine.

These opinions, gentlemen, have been beautifully expressed in verse by one of our most illustrious poets. Casimir Delavigne, in his poem on Vaccination, says:—

> Puisez le germe heureux dans sa fraîcheur première,
> Quand le soleil *cinq fois* a fourni sa carrière.

[Draw forth the auspicious germ in its first freshness, when the sun has *five times* completed his course.] Casimir Delavigne, in the poem from which I quote, gives with singular felicity and elegant precision the symptoms of cow-pox which he had observed along with Dr. Pariset, Secretary of the Academy of Medicine.

If then you wish to have vaccine lymph possessed of all its power, and of the greatest possible amount of efficiency as a protection from small-pox, you must take it at a sufficiently early stage of the pock: you must take it between the fifth and seventh days inclusive. Matter taken at that period produces a large pock, which becomes surrounded by a large and more lasting areola of inflammation: in a word, a cow-pock is obtained more vigorous than if the virus used had been taken at a more advanced stage.

During an epidemic of small-pox, if you can procure no better vaccinal matter, you may vaccinate with lymph taken from a forty-eight hours' old pimple: its activity will be less than if taken some days later, but greater than at the eighth day. When eight-day lymph is used, evolution proceeds more slowly, the papule not appearing till the third day, whereas when use is made of lymph taken between the fifth and seventh days inclusive, the papule is visible on the second day. In the former case, the areola appears on the seventh or eighth day, and in the latter, on the fifth or sixth. The one begins to dry up on the eleventh or twelfth, and the other on

the twelfth or thirteenth. Finally, while the period for maturation is from eight to nine times forty-eight hours for eight-day lymph, it is prolonged to eleven or twelve nycthemera when the lymph used has been taken between the fifth and seventh days.

The choice of the subjects from whom the supply of vaccine lymph is derived, and the health of the persons to be vaccinated are also matters of importance; for if the conditions favourable to the perfect development of a germ are inherent in the germ itself, so likewise are they in the soil wherein it germinates and grows. In respect of the selection of persons from whom to take vaccine lymph, it has been shown that they ought to be in good health and of vigorous constitution, as the pock is much better developed in them than in sickly drooping persons.

But, gentlemen, there is a point to which I desire to call your special attention to-day; it is—*never to vaccinate with lymph taken from one under the influence of the syphilitic diathesis.* The transmission of the great-pox by vaccination is a fact which now seems to have been demonstrated. Since the beginning of this century, and particularly in later years, cases of this kind have been recorded both in France and in foreign countries; to them I can add one which you have seen in the clinical wards, and which I shall now briefly recall to your recollection.

The patient, a young woman of eighteen years of age, came into the Hôtel-Dieu for a uterine affection. As we had at the time some cases of small-pox, I recommended that she should have herself vaccinated. The lymph was taken from a child apparently in perfect health, and from the same lymph four infants in the nursery-ward were also vaccinated. Cow-pox was regularly developed in the children, and during their residence in hospital nothing anomalous was noticed, but unfortunately when they left, we lost sight of them. The young woman had false cow-pox: on the day after vaccination, the punctures became salient; they were surrounded by an inflamed areola, and accompanied by great itching of the skin; in four or five days, no trace of puncture remained. The patient then left us, but it was agreed that she should return once a fortnight to follow out the treatment of the uterine affection. On her first return, twenty-three days after vaccination, she drew attention to the punctures on both arms: two of those on the left arm seemed to have taken: I observed that the pustules were ecthyma. At her next visit, a fortnight later, the pustules of ecthyma were observed to have become

transformed into scabs of rupia indurated at the base: in the axilla, we found some of the lymphatic glands in a state of indolent turgescence; finally, an eruption of roseola clearly showed that the woman was under the influence of syphilitic poisoning, and that the starting-point of the poison was incontestably the vaccination pustules.

Gentlemen, you know how many questions have been recently raised in relation to cases of this kind: the subject is one of grave importance and its discussion is not yet closed. If some physicians still doubt the possibility of syphilis being communicated in vaccination, the majority are open to the logic of facts, and remain on the alert. But among those who constitute this majority, what diversity of opinion exists! Some hold that syphilis is transmissible and inoculable through the medium of the vaccine virus, others, absolving the vaccine virus from all blame, hold that the syphilitic virus passes with the blood which has accidentally been drawn in taking the lymph from the pock.

I shall not stop to discuss the two classes of facts by which these views are respectively supported, as my own experience is insufficient to solve the difficulty. The fact which I wish to impress upon you is this—that syphilis has in numerous cases been transmitted in vaccination. I cannot better bring my remarks on this subject to a close, than by quoting some of the conclusions in relation to it which have been arrived at by Dr. Viennois of Lyons.[1]

I agree with Viennois that one ought never to use vaccine lymph taken from a suspected subject, and that in respect of infants one ought not to take it unless the infant has passed four or five months, the age at which hereditary syphilis usually shows itself by visible signs: for infantile syphilis, even before it appears on the exterior parts of the body, is transmissible. But I cannot in any degree adopt the conclusions of this author when he adds:—"if special circumstances make it necessary to take vaccination lymph from a syphilitic patient, great care must be observed so as to draw the pure lymph without the slightest admixture of blood or syphilitic humour." I cannot in any circumstances whatever sanction vaccine matter being taken from a syphilitic subject. It is more a matter of hypothesis than of demonstration, that it is only by the blood that syphilis is transmitted in this class of cases. Besides, it is

[1] Viennois:—Archives Générales de Médecine, Juin, Juillet, et Septembre, Paris, 1860.

rather difficult to understand how that which is contained in the serum of the blood, that is the syphilitic virus, should not also be contained in the serosity of the vaccinal pock. Finally, it is so difficult to draw off the vaccine lymph free from "the slightest admixture of blood or syphilitic humour," that the recommendation of the required precaution amounts, so far as I am concerned, to a prohibition. My opinion on this point admits of no modification. Abstain always from taking lymph from a syphilitic subject.

In the discussion which took place in 1864 and 1865 in the Academy of Medicine, upon the transmission of syphilis in vaccination, MM. Depaul and Bouvier demonstrated the relative frequency of cases of transmission, and showed that vaccination carried out with lympa derived from a syphilitic child may sometimes assume the character of a real social calamity. Thus in 1856, at Lupara in the Neapolitan territory, Dr. Marone vaccinated in the beginning of November a certain number of children with lymph in tubes which came from Campo-Basso: it was slightly coloured with blood though as clear and transparent as usual. The first child vaccinated with this lymph was Philomène Listori, aged eight months, and from her the others were vaccinated, of whom, besides Philomène Listori, twenty-two, being nearly the entire number vaccinated, took syphilis. These children were born of healthy parents, and all had from their birth to the date of vaccination, been free from venereal symptoms. In most of them, vaccination took effect on the first trial, but in some the operation required to be repeated. The vaccinal pock was followed by characteristic venereal ulcerations, accompanied by swelling of the axillary glands. Then, a little sooner in some, and a little later in others, but in the majority about the middle of January, 1857, there appeared eruptions of roseola, impetigo, syphilitic papules and even pemphigus: these eruptions were soon succeeded by mucinous scabs on the lips, the interior of the mouth, on the parts around the anus, on the vulva and on the scrotum, with consecutive enlargement of the posterior cervical and inguinal glands, loss of flesh and a disturbance of the general health proportionate to the severity of the case. The mothers, most of whom suckled their infants, contracted syphilis from them. A series of venereal symptoms, at first local, and which Dr. Marone has well described, manifested themselves in these unfortunates. Some of them communicated the disease to their husbands. From fathers and mothers, it extended to other members of the family, to

children under puberty of both sexes, and sometimes to entire families. Almost all the women who became pregnant miscarried, bringing forth syphilitic infants, or dead fœtuses presenting in some cases traces of syphilis. Most of the patients were cured by specific treatment: there was, however, a great tendency to relapses; and in some cases, two years and a half had elapsed before the disease was eradicated. Some of the infants died, and several of the adults were in jeopardy. Dr. Marone had taken lymph from the first series he vaccinated for the purpose of vaccinating others. Eleven of this second series contracted syphilis like the first, and communicated it to their mothers, who gave it to eleven nurslings who had not been vaccinated. Some of the women gave the disease to their husbands, and all the young girls were also affected through their contact with the nurses and children. It appears, therefore, that at Lupara thirty-four children were inoculated with syphilis in being vaccinated; and that a greater number of individuals of different ages were directly or indirectly contaminated by these children. At Rivalta, there were eighty victims.

The details now laid before you are given by M. Bouvier. I have now to add, on the authority of M. Depaul, the history of forty infants contaminated with syphilis out of forty-six vaccinated in 1821. According to the report of M. Cerioli, there were thus from four original cases 155 children directly infected with syphilis by vaccination, and there were others secondarily infected through them, bringing up to 300 the total number of syphilitic contaminations. I cannot, therefore, too earnestly recommend you to examine with the greatest possible minuteness the subject from which you take the lymph for your vaccinations, and to abstain from taking it not only from syphilitic persons, but likewise from all who present the slightest ground for your suspecting that they have venereal contamination.

With respect to those whom it is wished to vaccinate, we have to bear in mind age, constitution, certain antecedent diseases, and also the diseases which supervene during the progress of cow-pox. Vaccination succeeds better in childhood than in adult age: it must not, however, be supposed that the younger the infant the greater is the fitness. At the age of some months, vaccination does much better than in the new-born infant. The cow-pock will be much finer in an individual of good health and sound constitution than in one who is weak and drooping. In the latter, the vaccinal pimple is

softer and less prominent, its areola is smaller, of a dull-red colour, and desiccates at an earlier date. M. Truchetet, finding by experiment that lymph taken from persons of unsound health became very feeble in its third generation, abandoned the use of it after two transmissions.

Acute antecedent diseases have no effect on vaccination, provided the child has recovered its health. Small-pox and cow-pox, however, are exceptions to this law: it may be superfluous to say so, after what I have several times repeated, to the effect that there is an antagonism between the two diseases, and that they reciprocally confer immunity from one another. Nevertheless, cases have been cited, and I have also seen cases, in which vaccination took effect in persons who had had small-pox previously; but such cases are very rare, and when they are looked into, it is generally found that the cow-pox was of a feeble, spurious kind: regular cow-pox after small-pox is exceedingly uncommon. Examples of antecedent vaccination not preventing a subsequent vaccination from producing cow-pox have been occasionally noticed from the date of Jenner's discovery downwards: indeed two cases of this class are recorded by Jenner himself, in which vaccinated persons went through normal cox-pox a second and even a third time, but at long intervals. Such cases, however, are at least quite as exceptional as the occurrence of cow-pox in persons who have previously had small-pox.

Is there anything surprising in these returns of the disease? Was it not known that small-pox might attack the same person more than once? Why then, may not its congener cow-pox likewise offer sometimes an exception to the general rule? Such exceptions were, moreover, much more uncommon formerly than now that the vaccine lymph in general use has undoubtedly become degenerated. But before pronouncing any opinion on the number and value of these second attacks, it is important among other things to ascertain whether the persons in whom vaccination has taken effect more than once have ever had previously the legitimate cow-pock, in what condition it was developed, in what manner vaccination was performed, and what was the date of the first vaccination; it is particularly important to ascertain positively that the second vaccinal eruption is not that which is called false cow-pox, which may sometimes be mistaken for the true, and to which I shall return, as it is indispensable to be acquainted with the differential diagnosis of the two affections.

It has been also asked, gentlemen, whether cow-pox, an affection which so radically modifies the economy, and is in the opinion of some observers only a form of small-pox, does not sometimes declare its presence by a general eruption : indeed, there is room for surprise that such is not ordinarily its mode of manifestation. I have often recalled to your attention a case which I saw in the Necker Hospital, and I am not the only vaccinator who has observed cases of this kind. I vaccinated a strong young child, making eight punctures. Eleven days afterwards, to my great astonishment, I saw on the face, trunk and limbs twenty-seven pocks having exactly the appearance of cow-pox. I confess that at first I believed in a general eruption, like that which follows variolous inoculation, but on a closer examination I abandoned that idea, or at least I entertained great doubts as to its correctness. Before vaccination, the child had sudamina all over the body. It was summer. He scratched the vaccinal pimples which were excoriated, and thus he carried the virus on his nails to parts denuded of epidermis, and so produced on these parts vaccinal pocks. Inoculation of cow-pox in a recently vaccinated child takes place readily, but the time comes when attempts at this kind of secondary vaccination prove abortive.

You have often seen the experiments which I have made in the wards in relation to this point. I vaccinate : in four days I make a new puncture with a lancet charged from one of the incipient pustules; I continue to do this daily; and you have seen that up to the ninth and sometimes till the tenth day—but not later than that—there is a cow-pock developed at each new puncture. The secondary pocks, however, do not attain to the size of the primary pock, and it is observed that the secondary pocks earliest in date are the best developed, and that in succession, as the date of the puncture from which they proceed becomes more distant from that of the original vaccination, they lose the normal appearance, those of the ninth and tenth days aborting soon after being slightly inflamed; whilst after the tenth day, the prick produces no more effect than if the lancet were charged with the pus of an ordinary boil. Our little patient of the Necker Hospital must, therefore, have secondarily vaccinated himself, at latest, seven or eight days after the primary vaccination.

The general pustular eruption of which I have just spoken, and the occurrence of which is altogether exceptional, must not be con-

founded with a secondary eruption very common in small-pox, and of which physicians give different explanations. On the seventh, or at latest on the eighth day after vaccination, fever is lighted up, analogous to the fever of maturation in small-pox. It is generally, and I think correctly believed that this fever is symptomatic of the very acute inflammation going on around each pock, and of the swelling of the axillary lymphatic glands. Another interpretation is, that it is simply the general fever of invasion dependent on the disturbance of the system caused by the reception of the vaccine virus, just as the fever of the eighth and ninth day after variolous inoculation is nothing more than the invasion-fever of the small-pox then becoming developed in the system, and not at all a symptom of the inflammation manifested around the pustule of inoculation. Looking at it from this point of view, we are obliged to hold that the vaccinal fever is not the necessary consequence of the general cutaneous eruption, differing in this respect from the eruptive fever in small-pox and measles. But as the secondary vaccinal eruption occurs very often, and as in summer as many children have it as escape it, the question may be asked, whether the initiatory vaccinal fever may not, up to a certain point, be analogous to scarlatinous fever, which, as I shall have to tell you on some future occasion, is not always followed by the specific exanthem. Finally, without going in search of explanations more or less hypothetical, we may consider the eruption frequently seen about the tenth or eleventh day after vaccination to be nothing more than that exanthem so common in children having suppuration going on in some part, and at the same time, fever and copious sweating. In point of fact, gentlemen, the secondary vaccinal eruption differs in no respect from that which I have called sudoral eruption, regarding which it is my intention to speak in an early lecture. It is a measly or scarlatiniform exanthem, almost always very transitory, sometimes, however, taking the more severe form of acute eczema, or impetiginous eczema, and constituting the first link in the very long chain of suppurations of the skin and mucous membranes which have caused a sort of reprobation of vaccination still existing among prejudiced and ignorant people.

Let us now return, gentlemen, to other conditions which modify cow-pox.

Chronic diseases, by reducing the vital power of the economy and weakening the constitution, necessarily produce a condition un-

favourable to the development of cow-pox. Infants with hereditary syphilis readily take the cow-pox, whether the syphilis be still latent, or whether it has showed itself by unmistakable visible signs. Without entering into too much detail, I would, in proof of this assertion, remark that you have often seen in my wards the normal development of cow-pox in infants who at a later period showed symptoms of hereditary syphilis, as well as in other infants who were admitted to be treated for syphilitic psoriasis, rupia, and other venereal affections. Syphilis, then, does not constitute an obstacle to the development of cow-pox. It is not so with the eruptive fevers. For example, when measles or scarlatina supervene during an attack of syphilis, the progress of the latter is arrested, and is not resumed till the exanthematous disease has run its course.

As small-pox and cow-pox mutually exclude one another, it seems rational to believe that the two diseases cannot co-exist. Again, it has been demonstrated that the incompatibility of the two is not declared till the fifth, sixth, or seventh day of normal cow-pox. If the system is under the influence of the variolous poison during a few days immediately succeeding vaccination, the small-pox and the cow-pox both germinate and become simultaneously developed without in any way influencing one another. The experiments of Woodville leave no room for doubting this, and M. Bousquet states that Professor Leroux has seen a vaccinal pock implanted, as it were, in the centre of a variolous pock. "He separately inoculated the two viruses: vaccination produced cow-pox with all its advantages, and variolation produced small-pox with all its dangers." I have seen the two diseases develope themselves simultaneously. I am well aware, and I ought to tell you, that statements have been published in contradiction to the cases I now refer to as having seen. Thus, a physician of Dunkirk, Dr. Zandyck, concluded from experiments which he made during an epidemic of small-pox, that persons vaccinated during the incubation of small-pox always had modified small-pox with its symptoms and characteristics. Similar results were obtained in experiments made by MM. Rayer, Hérard, and Tardieu. The latter has even recorded a case in which he saw success attend vaccination performed at the beginning of a variolous eruption. Although this case is unique, Dr. Zandyck does not the less decidedly give his opinion that vaccination ought to be practised under these circumstances, inasmuch as the dangers never originate in the cow-pox, but in the small-pox simple or complicated:

most assuredly he is right. Dr. Zandyck is of opinion that the affection—cow-pox or small-pox—which is first in possession, influences, but is not influenced by the other.[1] I have, however, told you that the experiments of Woodville and Bousquet, as well as my own, demonstrated that cow-pox and small-pox become simultaneously developed, without exerting any influence on one another: and my observations have been confirmed by the paper of M. Mare d'Espine, published in the *Archives Générales de Médecine* for June and July, 1859.

You have recently had under your observation a new proof of the correctness of this opinion. A mother and her infant of two months old simultaneously took small-pox in our wards. The mother, though never vaccinated, had the distinct form of the disease, which ran a course like that of modified small-pox; but the infant had a confluent eruption, and died on the eleventh day. This infant had nevertheless been vaccinated on the second or third day of small-pox incubation: the vaccination ran a perfectly normal course, there being, however, only one pock from six punctures. On the eighth day, a period at which there was no ground for supposing that the child was breeding small-pox, two new punctures were made below the pock, when two other pocks developed themselves in a regular manner. It was not till the third day of the variolous eruption that all the vaccinal pocks appeared modified in their mode of evolution: they were then the seat of hæmorrhage which extended to the surrounding cellular tissue, and the sub-vaccinal ecchymosis became very hard. You have seen that in this case the patient derived no benefit from the cow-pox, which did not prevent death from confluent small-pox. It is but fair, however, to remark that this child was only two months old, and that the termination of small-pox, as well as of erysipelas, is almost always fatal at that early age.

As a set-off to this unfortunate history, I must mention a case which several of you had an opportunity of seeing in 1861, and which tends to support the opinion of MM. Zandyck, Rayer, Hérard, and Tardieu. The patient was a male infant of eleven months, whom I had vaccinated during the incubation of small-pox. The progress of the cow-pox was retarded up to the eighth day; that

[1] Zandyck:—Essai sur l'Epidémie de Variole et de Varioloïde qui a regné à Dunkerke en 1848, et 1849. Paris, 1857.

is to say, the pimples did not show themselves till the fifth day, and the pustular development proceeded exceedingly slowly. On the eighth day, the child was seized with fever, vomiting and diarrhœa, which continued for two days, and on the following day the variolous eruption appeared. It pursued its normal course till the fifth day, when the pustules became dry and crusted. The small-pox had then been modified by the cow-pox, which, on the very day of the appearance of the small-pox eruption, showed itself in beautiful pocks which followed a regular course.

To sum up what I have said on this subject:—If you wish to propagate efficient cow-pox, you must select your virus under circumstances as favourable as possible for securing its activity, you must take it from children who are healthy and of sound constitution, you must choose pocks which are large, beautiful, in full bloom [*bien fleuries*] if I may be allowed the expression, and which are from five to seven days old.

However we may explain it, gentlemen, taking into account all the conditions and circumstances to which I have directed your attention, it cannot, in the first place, be denied that it is much more common nowadays than at the commencement of the century, to meet with anomalous cow-pox, which bears the same relation to cow-pox as modified small-pox bears to small-pox: and in the second place, all vaccinators have seen—as I have seen—a very considerable number of persons with cow-pox who had been previously vaccinated. The normality of the first vaccination had been proved by insusceptibility to re-vaccination lasting for a number of years, by immunity from epidemics of small-pox, and also by the length of time which elapsed before successful re-vaccination was possible.

By vaccinating from arm to arm, there is certainly the least risk of failure; but as we cannot always have recourse to the pock itself, we are frequently compelled to use preserved lymph. I do not propose to enumerate the different plans of preservation which have been devised. You are acquainted with the method of placing the lymph between two perfectly smooth plates of glass of about two or three square centimeters: the dried lymph between the glass plates, (which are closely applied the one upon the other,) may be kept in this way protected from air and light, provided the plates are, as is usual, enveloped in tin-foil. The method which I prefer consists in shutting up the lymph in capillary tubes—not in phial-tubes, which are most objectionable, as it is impossible to fill them with the

virus, which consequently is left in contact with air, and so does not keep. The tubes which I recommend are in the strictest sense capillary: as you have often seen them employed, you know that the proceeding is simplicity itself. When you wish to fill them, you open a vaccinal pock by making very slight scarifications in the elevated epidermis: forthwith, an exudation of minute drops of serosity is seen: this lymph is collected by moving over the surface of the pock the extremity of the tube, which ought to be held almost horizontally: the liquid is drawn into the tube by capillary attraction. The proceeding is continued till the tube is nearly full, when it is closed by holding in the flame of a candle, first, the end by which the lymph entered, and then the other. When you wish to use the lymph, you break off both extremities of the tube, place one of them between the lips and blow through the tube, placing the other extremity upon the thumb-nail or the blade of a lancet: a small drop is then deposited.

I need not describe the operation of vaccination. You all know how to perform it, and you likewise know the place which ought to be generally selected. There are just two matters of detail to which I wish to refer: the one is the number of punctures which ought to be made, and the other, the circumstances under which it is expedient to select another than the usual place for operating.

How many punctures ought to be made? This is not an unimportant question. Although the production of a single pock is generally sufficient to confer immunity from small-pox, the labours of Eichborn have demonstrated that it is not always sufficient. Dr. Marson, an English physician, has lately conclusively confirmed this opinion of the German pathologist. He has shown, from excellently handled statistical data, that of the vaccinated persons who take small-pox, those have it in the mildest and most modified form who bear more than one vaccinal cicatrix. Here is a summary of Dr. Marson's observations as given by my friend Dr. Lasègue. Of 768 small-pox patients with one cicatrix, 550 had the disease in a modified form, and 3 died, giving a mortality of 3·9 per 1000. Of 608 with two cicatrices, 486 had modified small-pox, and 1 died, giving a mortality of 1·6 per 1000. Of 187 with three cicatrices, 156 had modified small-pox. Finally, of 202 individuals presenting four or more vaccinal cicatrices, 182 had modified small-pox and none of them died. These figures speak with emphasis, and taken along with others less decisive, though valuable, demonstrate that

the number of punctures made in vaccinating is a matter of importance.

There is a prejudice against which I wish to put you on your guard; viz. prohibiting the washing or bathing of the infant on the day of vaccination, and for some days afterwards. The uselessness of these precautions was shown by experiments made in 1863 by Dr. Peter, then my *chef de clinique*, now my colleague in the hospitals and Professor *agrégé* of the Faculty. Acting on my recommendation, Dr. Peter, after vaccinating a child by means of three punctures on each arm, immediately washed the right arm with a copious splash of water, at the same time rubbing it vigorously. The vaccinal eruption not only appeared on the right arm of all the infants thus treated, but, by a strange chance, the pustules were most numerous and most beautiful on the washed arm. This experiment was repeated on more than sixty infants, and as the results were always similar, it is evident that we ought to give no countenance to the puerile prohibition of ablution for some days after vaccination. Besides, how can one believe in the absorption of the virus being hindered by bathing or washing, when the experiments made in 1862 by Dr. Martin demonstrated that it was not prevented by cauterization. This young physician, who was an *interne* at Saint Lazarus Hospital when he made the experiments, applied potassa fusa [*caustique de Vienne*] to the punctures of vaccination some minutes after he made them, and the deep cauterization thus produced did not prevent absorption of the virus, although it prevented vaccinal pocks from appearing: it was found that the subject so treated acquired immunity, and that subsequent attempts to produce cow-pox were ineffectual.[1]

The consideration of the rule to be followed in selecting the punctures, and the modifications which may be required in that rule, lead me to speak of vaccination as a means of curing vascular nævus maternus. This method of treating erectile tumours has been practised in England by Hodgson, Earle and Cumming, and is mentioned by numerous French practitioners, some of whom have also employed it, particularly Baudelocque, Rayer, Velpeau, Bousquet, Paul Guersant, Pigeaux, Lafargue of St. Emilion, Costilhes, Laboulbène, Marjolin, Blache, &c. It offers the double advantage of conferring vaccinal immunity and of getting rid of an affection

[1] Peter:—Des Maladies Virulentes Comparées, 1863, p. 17.

which, at a later period, by assuming increased development, might become at least a serious infirmity, though not exactly a disease. Legendre has published a note on this eminently practical subject in the *Archives Générales de Médecine* for May, 1856. Our lamented colleague, in publishing a case which had come under his observation, has formulated some practical rules. He says that before vaccinating an infant, inquiry ought to be made as to whether it has nævus, for it is obvious that if this method of cure is to be employed, it must be had recourse to uninterfered with by antecedent vaccination. When the existence of an erectile tumour is ascertained, it ought forthwith to be treated by vaccination. This rule extends even to those which are likely to disappear spontaneously, as the proceeding involves no risk, and as it often happens that simple vascular stains on the skin hardly causing the slightest elevation and resembling flea-bites in appearance ultimately become bulky tumours.

As vaccination cures nævi by the inflammatory process set up in connection with the development of the pock, it follows, that in proportion to the size of the erectile tumour ought the vaccinal punctures to be more or less numerous. For the same reason, it is important that all the pocks should be freely developed, and to secure this, the vaccination should be made from arm to arm on the fifth or sixth day of the pock, so that virus employed may be at its maximum of activity. The punctures ought to be so made as only to involve the superficial lymphatic network of the skin, and the lancet must be newly charged for each puncture. To avoid bleeding, of which there is risk when the tumour is very vascular, it may be well to substitute for the lancet a needle, or an exceedingly fine-pointed instrument, such as several practitioners have had made for this particular operation. Some have recommended that the vaccinal punctures be made around and not in the erectile tumour. By adopting that plan, there is obtained a series of pocks which, being partly on the sound skin and partly on the nævus, circumscribe and invade the latter, determining an inflammation which accomplishes a complete cure. When the vaccinal crusts fall off, the place of the tumour is found to be occupied by a smooth cicatrix which is either perfectly white or still dotted with a few red points: these red points are isolated, not elevated, in size not larger than a small pin's point, and their increase in volume is rendered impossible by their being situated on cicatrix-tissue. This method of treatment is

applicable when the nævi are situated on the trunk and limbs, but not when they are on the face, as in the latter situation the cicatrix will be very extensive, and may even be larger than the nævus.

Modified Cow-pox.—Regeneration of Lymph.—Re-vaccination.—Vaccination at the Bar of Public Opinion.

I said that I should return to the subject of *false cow-pox*, an affection which it is necessary to be able to recognise, so that it may not be mistaken for true cow-pox. It has been thus described by M. Bousquet:—

"True cow-pox hardly begins to show itself at the end of the third day, but the false is much earlier, and may be seen from the first to the second day after introduction of the virus, a circumstance which from the first constitutes a distinction between the two affections. But this precocity is not by itself sufficient to establish a differential diagnosis. False cow-pox is sometimes so rapid in its course as only to appear that it may disappear: at other times it shows itself in the form of a small pimple, more appreciable by the eye than by the sense of touch. This pimple goes on increasing in size till the fourth or fifth day, leaving the physician uncertain as to its future progress; but on the sixth or seventh day, in place of becoming developed, its progress is arrested, it grows pale, and dries up: at other times, it advances farther, always preserving in its rapid development, a conical and globular shape which I look upon as an unerring a sign of false cow-pox as the flattening and central depression of the pock are signs specifically characteristic of the true."

"The false pock is sometimes red and sometimes yellowish. It never assumes the brilliant silvery lustre which distinguishes the prophylactic cow-pock. Though not exactly irregular in shape, it has an ill-defined margin. Some time between the fourth and seventh day—for the false cow-pock has nothing fixed or normal in its course—it becomes yellow, suppurates, and dries up."

To this description it may be added, that false cow-pox is often accompanied, as local symptoms, by inflammatory induration of the subjacent cellular tissue, disagreeable itching in the affected parts, swelling and pain in the axillary glands; and as general symptoms, by restlessness, headache, and sometimes by fever.

There is another kind of false, or, to speak more correctly, of aborted, cox-pox. It is met with when the pustules of true cow-pox have their development arrested or impeded by excoriations caused by the scratching of the infant, by the pressure of too tight clothes, or by the irritation of unnecessary handling. Under such circumstances, the suppuration begins at once: the pustule becomes yellow, swells, and its virulent lymph disappears.

The term false cow-pox which I have employed is not quite a correct term. Gentlemen, neither false cow-pox nor false small-pox has any existence. When the economy is in no state of aptitude for receiving or developing the virus of small-pox or cow-pox, the puncture made in vaccinating produces no more effect than if the lancet had been charged with pus from a common boil; when there is some partial aptitude, the result is abortive cow-pox at the end of some days; when there is a state of still greater aptitude, the pock, quicker in its evolution than in the normal order of events, closely resembles that of regular cow-pox; but it passes away more rapidly. In a word, we have modified cow-pox, just as we have modified small-pox.

I have described the manner of propagating that legitimate cow-pox, which will confer immunity from small-pox, and have pointed out the manner of preventing degeneration of the virus. But is it possible to regenerate virus which has lost its original energy? It certainly would not be difficult to do so, if one could always go back to the original source—provided we could always obtain cow-pox from the cow. Unfortunately, that is impossible. The question then is:—Can we, in the circumstances in which we are placed, by any means accomplish that object so much to be desired, the regeneration of vaccine lymph? Cannot we, by taking lymph of the best quality and propagating it through a succession of the most favourable subjects, do the same for it which horticulturists do for plants, when, from seeds of the most common-place kinds, they obtain, after a succession of generations, the most beautiful varieties, by always sowing chosen seed in chosen soil?

The observations which I made, along with M. Delpech, on the inoculation of small-pox, give credibility to this supposition. A girl of 17, whom I had vaccinated in her infancy, was admitted into my wards at the Necker Hospital, with mild modified small-pox. With variolous matter taken from this young girl, I inoculated a child,

making only one puncture: the pustule of inoculation became developed, without any other eruption being produced. A second child was inoculated with matter from the first: in this case, besides the development of the inoculation-pustule, there was a secondary variolous eruption in the distinct form. A third child was inoculated with matter from the second: in this case, the eruption was more abundant. Last of all, in the fifth generation, the variolous eruption was confluent: the small-pox had become regenerated.

Why has not a similar plan been pursued with vaccine lymph? Experiments were instituted under my observation by M. Truchetet in the wards now under my charge. We employed lymph taken on the sixth day, that is to say weak lymph which did not become papular till the third or fourth day, nor pustular till the sixth, nor surrounded by an areola till the seventh, nor desiccated till the tenth; nor did the crusts fall till about the fifteenth day. We inoculated a healthy child: we took matter on the fourth or fifth day from this child, and successively transmitted it to other children in the best possible state of health. After a certain number of generations, the lymph appeared to us to have become more energetic, to manifest its effects more quickly, and to take a longer time to complete its evolution, than the lymph with which we commenced the series of inoculations. Not wishing to put too much reliance in our own impressions, a child was sent to the *mairie* of the eleventh *arondissement* to be vaccinated. On the eighth day, lymph was taken from this child, and with it the left arm of a healthy child was vaccinated, while, at the same time, the right arm was vaccinated with lymph taken from a subject in our wards. Several other children were vaccinated in the same manner, and our impression was that our "regenerated" lymph was more energetic than the lymph used in the town.

As the results of these experiments challenge a positive admission of the doctrine that vaccine lymph can be regenerated, they ought to be repeated and generalised. Unfortunately, it cannot be denied, that the lymph in common use has become degenerated; and this, as I have pointed out, is perhaps exclusively due to the unfavourable circumstances under which the practice of vaccination is carried out. As in the present day, vaccination gives in many cases only temporary immunity in place of the absolute immunity which it seems to have imparted at the beginning of the century,

it is incumbent on us to revert to re-vaccination, a practice which has been long ago lauded.

Immediately after the promulgation of Jenner's discovery, as I have already had occasion to remark, doubts arose in England regarding the value of vaccination: even then, many physicians had proclaimed the necessity of re-vaccination after the lapse of a certain time. In France, at a later period, Drs. Berland, Boulu, Caillot, and Genouil stated their belief that the prophylactic power of vaccination was limited to ten, twelve, fourteen, fifteen, seventeen, eighteen, twenty, and twenty-five years. In 1825, M. Paul Dubois undertook the refutation of these statements, and rejected re-vaccination as a useless practice, although he admitted the apparently conclusive character of the facts on which it rested. In 1838, this important question was submitted to formal discussion in the Academy of Medicine, where re-vaccination encountered numerous adversaries, but where it also had most eminent defenders, such as Chomel and Bouillaud. The Academy adopted the conclusions of the commission appointed to report on the subject, which conclusions were adverse to the practice of re-vaccination. This decision, supposed to have been a definitive settlement of the question, was warmly defended by M. Dezeimeris, in his journal, the *Expérience*. He based his arguments upon numerous facts observed in France, and on rigorous statistics collected in Northern Germany. On the other side, Drs. Fiard and Hardy protested against the decision of the Academy—Dr. Fiard in a letter addressed to that scientific body, and Dr. Hardy in a paper published in the *Expérience*, in which he showed the agreement of the documentary evidence from England with that supplied by Denmark, Sweden, and Germany, and adduced by Dezeimeris.

Notwithstanding the diversity of opinion now noticed, re-vaccinations on a great scale were performed in the northern countries of Europe, particularly in Germany. Since 1823, every soldier, on admission into the Prussian army, has been immediately re-vaccinated. The practice, thus adopted in foreign countries, was in the first instance condemned in France, notwithstanding the vigorous manner in which some defended it, and although followed by numerous physicians of the highest repute, including Favart, Rayer, Robert and many others: it was afterwards mildly recommended, and has at last been accepted as a proper proceeding. Re-vaccination is now the rule in public practice, and it has been made obli-

gatory in the French army. Epidemics of small-pox have only made it too clear, that when small-pox prevailed in a population, persons who had been long previously vaccinated were struck, and that the disease was most severe in those in whom the date of vaccination was most remote.

The history of epidemics ought to tell us what is the influence of re-vaccination upon the progress of small-pox, and I cannot give you a better example of the information which they afford than by laying before you the abstract of the excellent work on this subject by Dr. Gintrac, published in the *Gazette des Hôpitaux* of 11th July, 1857 :—

"In a parish containing a population of about 2,600 souls, a young woman who had been vaccinated was attacked, towards the end of October, 1853, with small-pox contracted during a long residence with a relation suffering from that disease. During the whole of her illness this young woman was attended by her mother, who also took the disease, although she was fifty-seven years of age, and had been vaccinated. Both recovered: but, early in January, at the beginning of the mother's convalescence, the disease was becoming epidemic. It invaded families, attacking each member in succession or simultaneously. In January, the number of persons seized exceeded 180, and by the 10th of February it had reached nearly 260. From day to day, the number rapidly increased. Men and women, vaccinated and unvaccinated persons, those who had had and those who had not had small-pox, yielded in almost equal proportions to the epidemic influence."

No opportunity could have been more favourable for studying the influence of vaccination upon the course and severity of small-pox. Dr. Gintrac, recapitulating the facts which he saw, has drawn the following conclusions :—

"There were no cases of small-pox in vaccinated subjects under twelve years of age. The greater the age of those attacked, or in other words, the longer the interval since vaccination, the greater was the severity of the disease. Some families strikingly exemplified the remarkable relation which existed between the more or less advanced age of the patient, and the greater or less severity of the attack. In a family of eight, father, mother and six children, the parents had confluent small-pox; three sons, aged twenty-six, twenty-three, and twenty-two respectively, had the disease less severely; two sons, aged eighteen and fifteen, had modified small-

pox; and the other son, aged twelve, though constantly exposed to the contagion in the same room with the others, had no eruption at all. In another family consisting of seven persons occupying the same lodging, five were struck down by the epidemic, of whom three had been vaccinated between twenty and thirty-five years, and two from fourteen to fifteen years previously. In all of them, there was a great similarity in the prodromic symptoms and eruption, but when the disease attained the suppurative stage, those who had been most recently vaccinated recovered in a few days, and the others suffered severely and had prolonged suppuration."

"It was ascertained that in general, the disease was decidedly modified, and essentially milder, in those who had been vaccinated: in them the duration of the attack was less than half of the usual duration. There were only prodromic and initiatory symptoms; when the period of suppuration was reached, desiccation took place, and the disease seemed from loss of power to be unable to proceed any farther. There were no fatal cases among the patients who had been vaccinated. Ten deaths occurred among the unvaccinated. The ages of those who died were one, two, twenty-one, twenty-three, twenty-seven, twenty-nine, thirty-one, fifty-two, fifty-five, and fifty-seven. In all of these cases, death took place during the suppurative period."

"In February, 1854, when the epidemic was daily striking down many individuals, the question of vaccination and re-vaccination was keenly discussed. It having been at last decided that both should be practised, they were immediately resorted to. In less than ten days, 180 vaccinations and 712 re-vaccinations were performed. The result surpassed the most sanguine hopes."

"In 180 persons vaccinated for the first time, 171 had true prophylactic pocks, which furnished lymph for vaccination; and in the nine remaining persons, there was no result."

"The possibility of vaccination taking effect twice in the same person is no longer doubted: it is nevertheless necessary to inquire what modification the vaccinal fermentation undergoes in persons previously vaccinated, and what is the course of the pocks in a second vaccination. Here are the results of 712 re-vaccinations. In 302 individuals, the success was complete: the pocks were developed about the fourth day and were full on the seventh: on the eighth day, they in due course became surrounded by an erysipelatous areola, then desiccated, and formed crusts which fell off on the

twentieth day. The pocks were umbilicated, and presented indisputably all the characters of the legitimate vaccinal eruption. In eighty-five of the re-vaccinated, the pocks were modified: they appeared on the third day after the punctures, became filled between the fifth and seventh days with a plastic lymph, became surrounded by a reddish areola, and sometimes even caused enlargement of the axillary glands. The non-umbilicated pocks presented neither the swelling nor hardness which belong to cow-pox, and when the crusts fell no perceptible cicatrix was left. In 119 cases, the introduction of the vaccine virus produced, within twenty-four hours, an acuminated pimple which rapidly disappeared. In 206 cases, no visible effect was produced on the skin. The persons who had been vaccinated and re-vaccinated, successfully or unsuccessfully, almost all escaped small-pox. There were five exceptions, but in these cases, vaccination only preceded the eruption of small-pox by a few days."

"The following are some of the conclusions drawn from the observations made during the epidemic."

"Small-pox did not attack indiscriminately and by chance: it generally seized the old and respected the young. If this epidemic has shown that cow-pox is not absolutely preservative, a fact established by the daily occurrence of sporadic cases, it has at least established that cow-pox exerts a salutary influence upon the issue of an attack of small-pox by shortening its duration and lessening its danger."

"Re-vaccination applied generally to a population during the full tide of an epidemic has at once arrested its ravages and destroyed its power of development: it has proved itself to be undeniably prophylactic, and it even seems to have imparted a certain degree of immunity to persons in whom the disease was already incubating. Finally, re-vaccinations performed in the midst of an epidemic have been found to be free from all bad consequences, notwithstanding the fears of evil which were entertained by some physicians."

The results of Dr. Gintrac's experiments agree in a remarkable manner with those obtained on a large scale in Germany, Denmark, and Sweden, of which you will find an account in the essay of Dezeimeris in volume second for 1838, of the *Expérience*.

The statistical summaries of the German authors, applicable to the four years, from 1834 to 1837 inclusive, prove that the occurrence of cases of small-pox became more and more unusual, just in pro-

portion as re-revaccination became more and more practised. I cannot place before you all the tables which have been drawn up in illustration of this subject, and must confine myself to the following brief abstract, which will give you a fair idea of the facts. In 1834 there were 619 cases of small-pox: in 1835, there were 259 cases: in 1836, there were only thirty; and although in 1837 the number was 94, that was very much under 619.

Other statistical summaries also corroborate that which was demonstrated by Dr. Gintrac's observations, to the effect, that the immunity derived from vaccination had become weak and temporary, and also that more than twenty-five years ago, the utility of re-revaccination was great. From the summaries referred to, it appears that of 44,000 persons who were revaccinated, 20,000 had the legitimate cow-pock, a result which superabundantly showed that nearly half of those operated on had lost their vaccinal immunity. Nine thousand had had abortive cow-pox. It was only in fifteen thousand that vaccination produced no other effect than a slight redness, lasting from twenty-four to thirty-six hours, round the place where the punctures had been made.

Similar conclusions were arrived at by Dr. Mare d'Espine of Geneva. You will find his papers in the *Archives Générales de Médecine* for June and July, 1859.

Another question has now to be solved:—What is the duration of vaccinal immunity? Or otherwise expressed:—At what age, and how often, ought individuals to be re-vaccinated?

So long ago as 1804, Dr. Godson raised doubts as to the preservative power of vaccination, and alleged that it did not confer immunity for more than three years: but on the other side of the question, Jenner then showed that the duration of the preservative power was much longer, by adducing cases in which he had ineffectually attempted to inoculate with small-pox persons who had had cow-pox, in one case, twenty-three, in another twenty-seven, and in a third fifty years previously. However, in the early days of vaccination, the immunity which it gave seemed so protracted as to lead to the belief that it might continue during the whole of life, but afterwards, when it became admitted that the immunity was not perpetual, endeavours were made to ascertain its limits. I have already said that in France, Drs. Caillot, Boulu, Berland, and Genouil had each fixed these limits, the first at ten or twelve years, the second at fourteen or fifteen, the third at seventeen or eighteen,

and the last-mentioned physician at from twenty to twenty-five years. But it is impossible to name any absolutely precise period. For example, I re-vaccinated three of my daughter's children: in the eldest, aged seven years, and in the second, aged five and a half, I saw normal cow-pox reproduced three years after their first vaccination, while in the third, who was under four years, there was no result when I vaccinated her the second time.

Dr. Marc d'Espine, holding very much the same opinion as Dr. Caillot, says that the first re-vaccination ought to be performed between the ages of ten and fifteen. He says that inasmuch as the generalisation of vaccination has advanced the age of the maximum frequency of small-pox from infancy to adolescence and maturity, so will the generalisation of re-vaccination carry it on twelve or fifteen years farther, bringing the maximum to a period of life beyond the age of thirty. Arguing in this way, he suggests the necessity of a second re-vaccination at thirty, and even a third re-vaccination about the age of forty.

Resting my convictions upon the facts which I have now cited, I generally recommend vaccination to be repeated as nearly as possible once every five years. If this practice is unnecessary, it is at all events free from objection. We ought certainly to endeavour to multiply the chances of immunity from small-pox — and even from modified small-pox, which, though generally a mild disease, is in exceptional cases attended with danger, a fact I was careful to point out when giving you its history.

The principles which apply to the re-vaccination of persons under thirty-five are equally applicable to those who have passed that age. Dr. Vleminckx, who recommended re-vaccination after thirty-five, was met with the objection, that when that period of life was attained the aptitude to contract small-pox had become less, it being alleged that the successful re-vaccination of persons of fifty and sixty did not in the least degree tend to show the existence of such an aptitude.

Maintaining the great principle hitherto generally admitted, that successful re-vaccination is proof of the return of aptitude to take small-pox, Dr. Vleminckx threw out the idea, that if the individuals referred to have either become insusceptible or less susceptible to variolous contagion in the ordinary way, they might perhaps contract the disease, if inoculated with the matter of small-pox: he then, defending his practice of re-vaccination, replied to objectors by

reminding them that cases of small-pox were still too common in this very class of persons.

The practical conclusion to be drawn from all the facts is that we ought to prescribe re-vaccination and a repetition of re-vaccination according to circumstances, but particularly if an epidemic of small-pox is prevailing; and that we ought to promote the general adoption of re-vaccination with as much zeal as we bestow on propagating the practice of vaccination, because re-vaccination undoubtedly augments the chance of resisting variolous contagion, and renders the disease milder in those who are not proof against it.

Gentlemen, the opposition, the unjust and vehement attacks which the immortal discovery of Jenner encountered when first announced to the world, have been renewed in our day. Within the last few years, some physicians, a very small number it is true, following the path opened up to them by a mathematician, a stranger to our art, have desired to put vaccination once more on its trial. These *vaccinophobists*—for that is the absurd name which they have taken—returning to the ideas of Rhazes, who regarded small-pox as a natural and useful depuration of the blood, exhuming the theories and ideas of the celebrated Hoffmann, of Willis, of Violante, and of Hahn (which perhaps, nevertheless, they did not understand), have asserted that small-pox was a necessary disease. They say that it is as old as the human race; that it exists as a germ in the economy; that every one has within his body a special proclivity, in virtue of which he must sooner or later be affected; and finally, that the prevention of the manifestation of the variolous germ is a proceeding similar to the practice of those who would wish to prevent the manifestation of the herpetic or gouty principle. They go much farther, for they add that cow-pox, by setting itself up in opposition to the external manifestations of small-pox, has originated new diseases more terrible than that which it was wished to destroy, and that in point of fact vaccination has raised the death-rate in Europe.

Such, gentlemen, are the conclusions at which statisticians have arrived after long and toilsome exertions! But are they unaware that the statistical weapon has two edges? Do they not know that from the same elements, from the same facts, one may lead, or be led to opposite conclusions? Do they not know that a statistician can make statistics say whatever he wishes them to say? If asked to prove this statement, I shall bring forward as a case in

point this very attempt to make out a charge against vaccination. On the one side, the vaccinophobists have used statistics to maintain their accusation, and the defence has equally derived its arguments from the same source. This is explained by the former having been dominated by a deplorable preconceived idea, and by the others having examined the figures in a spirit of enlightened and judicious criticism.

If it be a fact that there has been an increase in the rate of mortality in Europe, it would certainly be interesting to study the causes of the increase, but such inquiries would here be out of place, for, as I hope to prove, vaccination is in any case blameless. Be the conjecture true or false, it belongs to that vast question, the *displacement of mortality*, which involves as an accredited hypothesis the general principle which leads to the conclusion, that humanity pays the debt of death in accordance with an inevitable and inexorable law.

If small-pox played the essential part which some wish to assign to it, if it were a natural depuration of the blood, if it were almost an indispensable condition in the economy of the human body, it must have existed from all time. Although Hahn has laboriously disinterred notices of this disease from among the historical remains of Grecian Medicine, one must hold by the opinion held by Werlhof, and reproduced by Van Swieten. Small-pox was unknown in the times of Hippocrates, Galen, and Ætius: these illustrious observers make no mention of it. If it existed in their times, they must have described it, for they could not have disregarded a disease presenting such precise characters.

If we admit that small-pox is as old as the world, we must also admit that the germ remained quiescent for many centuries, till an opportunity occurred for manifesting itself. It would be necessary to assume, in respect of the whole human race from the creation, that which Rhazes and the partisans of his theory assume regarding each individual, viz. that the morbific germ of small-pox remains concealed in the body, for a longer or shorter period, in a home of its own, which Hoffmann localised in certain parts of the spinal marrow, which Willis and after him Violante placed in the supra-renal capsules—*capsulis atrabilariis, sive renibus succenturiatis dictis*—whence sooner or later, he said, it made its irruption. Need I say, that this doctrine is neither in accord with fact nor reason!

Small-pox, then, inasmuch as it has always existed, is not a neces-

sary malady. Nor is it a constitutional malady, for in constitutional diseases there must be a diathesis. Now, what do we mean by *diathesis?* Diathesis is a special state, a particular proclivity in the economy which is either hereditary or acquired, but which is essentially and invariably chronic: it is transmittible from father to son, and, in virtue of this hereditary power, is reproduced with identically the same fundamental character: in form, it is liable to modifications and varieties, but its morbid manifestations are in general strongly marked with a good deal of distinctiveness.

Gout and rheumatism, for example, are diasthetic maladies. When gout is quiescent during the interval between its attacks, the individual seems to enjoy perfect health; but when an attack comes on, the diathesis manifests itself, sometimes, by inflammation of joints, by peculiar secretions in particular parts, such as the joints, the skin (especially that of the hands), the soles of the feet—at other times, by neuralgic affections, asthma, gravel, or dyspeptic symptoms. In whatever way these manifestations appear, we can generally recognise in them an expression of the gouty diathesis. It is the same with rheumatism: the diathesis which constitutes that disease will make itself known in a great variety of forms, and by very different special lesions of the heart, fibrous tissues, nervous system, &c. These numerous forms of disease are all parts of one disease, which, by attention, we can diagnose. The same may also be said of scrofula. But the essential parts of these diatheses are on the one hand chronicity, and on the other, a tendency to returns and repetitions, not only in the same individual, but also in his direct and collateral descendants. Thus, a manifestation of the strumous or tubercular diathesis in any one organ leads us to fear strumous manifestations in other organs. An attack of gout or rheumatism in an individual makes us expect a succeeding attack; and a succession of such attacks leads us to apprehend that the disease will reappear in his children, for experience has taught us that gout, rheumatism, tubercle and scrofula descend from generation to generation.

Is it so with small-pox? Is it so with other contagious diseases? Small-pox is an essentially acute disease, which runs its course in a determinate space of time, leaving no trace of its passage except cicatrices on the skin. Will any one venture to say that it is hereditary? The cases of intra-uterine small-pox which occur are accounted for by contagion. But are the children of parents who

have had small-pox at some former period necessarily variolous, as children of tuberculous and gouty parents are born predisposed to tubercle and gout.

There are, however, some points of resemblance between contagious and diasthetic diseases, and indeed some have called the former the acute diatheses. Like diasthetic diseases, they involve a special disposition of the economy, but they differ from them essentially in being acute, and in not being transmittible by descent: they are caused only by the operation of a special morbific principle; and thus in a certain way they are transmittible from a sick person to another individual: but they differ from diasthetic diseases in being propagated by the transmission of a *contagium*.

From the very fact that small-pox has not always existed, it is evident that it must have become spontaneously developed in its first subject: it has originated, therefore, under the influence of causes which have escaped observation. If, moreover, it should one day disappear from pathology, as has disappeared leprosy, a disease so common in former times, or if it should cease to present the characters by which it is now recognised, it is reasonable to suppose that it can again originate without contagion, under the influence of causes similar to those whence it first sprung. This mode of development has hitherto, however, eluded observation, and no one can adduce a single well-established case of spontaneous small-pox. It was originally brought into Europe by contagion, and to this day is propagated by contagion. It is difficult to demonstrate the influence of contagion in great centres of population, where people are so commingled and so confusedly brought into contact with each other, but in small places it is more appreciable. If an epidemic of small-pox break out in a village where no case of the disease has been seen for twenty, twenty-five, or thirty years, it can generally be ascertained that it has been imported by some one who has come from a place where it was prevailing. Among other examples of this, read the cases published by Dr. Gintrac, whom I mentioned in connection with the subject of re-vaccination: read also the work of Dr. Marc d'Espine, wherein you will see how some epidemics can be followed up to their source.

It is not necessary that the person who conveys the contagion should have had the disease. All writers on the subject testify that the variolous *contagium* possesses an inconceivable power of repro-

duetion. The minutest drop of variolous matter, or the effluvia from a living or dead patient, are sufficient to transmit the disease. Moreover, the morbifie germ, like eertain volatile substances which, for a longer or shorter period, eling to the vases in which they have been shut up, or to the rooms in whieh they have been plaeed, has an action vast beyond all appreeiable limitation, a divisibility whieh is infinite: the most imperceptible atom is sometimes sufficient to engender the disease, just as the minutest spark of fire suffices to kindle a eonflagration when it falls amid eombustible materials. Small-pox is propagated by contagion, whether the *contagium* be eommunieated by inoeulation or by absorption from air earrying variolous effluvia. It is then neither a diasthetie, nor an essentially constitutional disease, and still less is it a disease neeessary to the human eeonomy, inasmueh as it has not always existed.

And, Gentlemen, it is not the only new disease. Was not Asiatie eholera a new disease in Franee when it broke out among us in 1832? I admit that it had been known in India long before that, but even in India where it seems to have had its origin, the date of its appearanee is not very remote, as the first well-authentieated epidemie observed, oeeurred in that eountry about the middle of last century. It is hardly eight years ago, sinee yellow-fever was unknown to more than four fifths of the globe, and to two thirds of the transatlantic hemisphere. Till then, it had so eompletely spared South America, notwithstanding the numerous lines of eommunieation established between north and south, that no ease had been seen in the Brazils, Bahia, Fernambouc, Buenos-Ayres and Monte Video. But after that time, having passed the line, it cruelly ravaged these countries, and began to reach the shores of the Paeifie ocean: it is only two years sinee it appeared at Lima, where it has been neither very fatal nor very severe; and till now it has not been seen in California. Unfortunately, there is every reason to believe, that it will eontinue its progress, and that proeeeding beyond its present limits, it will invade countries hitherto preserved from its ravages.

Besides the new diseases—small-pox, eholera, and yellow-fever—there are others whieh have been erroneously supposed to be new, some from the former means of diagnosis having been defective, and others from negleet of the histories left by our predeeessors. The detraetors of vaeeination point to these diseases, misealled new, when they argue that vaccination, by preventing the external mani-

festations of small-pox, has caused the development of diseases more terrible than small-pox itself. It has been said and written, that through the absence of small-pox, the blood is no longer depurated and the economy no longer put into a condition to resist morbid actions; hence, it has been said, proceed the uterine affections, the diphtheria, and particularly the typhoid fever so common in our day, and by the two latter of which communities are decimated.

But there were good reasons for uterine affections having been imperfectly known. The speculum which has rendered so great services to uterine diagnosis was not in common use till Récamier generalised its employment in the beginning of the present century, though it had been invented in the days of Paulus Ægineta, and Rhazes, and modified subsequently by Ambrose Paré, Scultet, and Garengeot. Fifty years ago, the vaginal examination of the uterus by the finger was unheard of, except in cases of pregnancy: up to that time women would have revolted at the very idea of such examinations, and no physician would have dared to propose them. Now, it is no longer so, and even our English neighbours have freely accepted the speculum and the *toucher*. Nowadays, we are likewise better acquainted than formerly with uterine pathology. Nevertheless, though then but imperfectly understood, uterine diseases existed in the days of our predecessors, as their writings testify. The pathological anatomy of these affections had engaged the attention of physicians, as you can see by reading the cases recorded by Morgagni, who quotes a certain number from the works of preceding authors.[1] Although the acquaintance with uterine affections was imperfect in early times, it was considerably diffused even among the general public, as is evident from the very significant manner in which they are alluded to in the epigrams of the ancient poets.

Diphtheria has also been proclaimed as a new conquest of human infirmity. In verity, a doleful conquest! It has been said that this terrible disease was unknown in former ages, and did not begin to show itself till after the practice of vaccination had become common. Need I discuss such a proposition as this? Any one possessed of even a very slight acquaintance with the history of medicine is aware that sore throat with plastic exudation [*angine couenneuse*], the most common form of diphtheria, was long ago observed and

[1] Morgagni:—De Sedibus et Causis Morborum: 45, 46 et 47.

described, and that authors of the most remote antiquity mention it. Iretæus called it the Syrian and the Egyptian disease, which shows that when he wrote, it was common in Syria and Egypt. Without going so far back into antiquity, but at the same time going back to the sixteenth century, an epoch remote from our own, it may be stated that Spanish physicians of that period described frightful epidemics of angina and croup which ravaged the Iberian peninsula and Italy. The name which they gave to this affection of the trachea was *morbus strangulatorius*, and they have also preserved the names by which it is commonly known—*garotillo* and *male in canna*. Finally, to come nearer our own times, was not gangrenous sore throat described a hundred years ago, in France, Sweden, Germany and America, under the names of diphtheritic angina and croup? Vaccination, therefore, cannot have the discredit of originating a disease which had an existence prior to vaccination. Indeed, if we were to reason after the manner of the vaccinophobists we might rather say that vaccination arrested the development of diphtheria, because by a singular chance never were diphtheritic angina and croup less prevalent than at the beginning of the present century, the very time at which cow-pox began to be propagated by vaccination.

The argument upon which the depreciators of vaccination chiefly rest is drawn from their allegation that typhoid fever is a more common disease now than prior to the Jennerian discovery. In reply, it is only necessary to refer to some pages of the aphorisms of Stoll; for in the short chapter which he devotes to putrid fever [*febris putrida*], it is impossible not to recognise our own typhoid fever, portrayed in its most striking characters and with all its symptoms. Is there any difference between it and the ataxo-adynamic fever of Pinel? Do not the works of Prost, published in 1802, show us this fever, attacking subjects of twenty and thirty years of age, who, be it remembered, had never been vaccinated, and in whose bodies were found on examination after death the very intestinal lesions now regarded as essentially characteristic of dothienteritis? Similar anatomical proofs are also supplied by the treatise of Petit and Serres. These physicians observed the affection, which they described in 1814, in individuals above fifteen years of age and who consequently could not have been vaccinated. Typhoid fever, then, so inappropriately appealed to, has no connection whatever with cow-pox: it existed long before Jenner, though under different

names, such for example as *synochus putris, febris putrida, la fièvre adynamique, la fièvre nerveuse, la fièvre maligne,* &c.

The physicians whose opinions I am now calling in question—because they have made some noise lately—see in typhoid fever a repressed small-pox, the eruption being, as they say, on the mucous surface of the intestine, in place of on the skin: they repeat the statement of Lecat, comprised in the name of *gangrenous mesenteric small-pox,* which he gave to an epidemic disease prevalent at Rouen in 1763. I am quite willing to admit that typhoid fever bears a resemblance to small-pox, to this extent, that its symptoms are those of an eruptive fever, and that it has a pimply eruption for its specific anatomical characteristic: but that is not the sense in which I understand that the attempt is made to establish the relationship of typhoid fever and small-pox. The physicians who call typhoid fever a kind of small-pox do not say that typhoid fever and small-pox are analogous, but that they are identical. They lose sight of the fact that the intestinal lesions of typhoid fever bear no resemblance to the pustules of small-pox. If it be said that the dissimilarity of the lesions is explained by the difference of their seats, I reply, that upon comparing in the most unprejudiced manner possible dothienteritic eruption with variolous eruption on the mucous membrane of the mouth and pharynx, I could not discover any similarity between them. Finally, if typhoid fever and small-pox are the same disease, persons who have had one could not take the other: and this is a point in respect of which facts utterly contradict the theory of the vaccinophobists. You have very recently seen in our wards convalescent small-pox patients seized with typhoid fever, and others during convalescence from severe attacks of typhoid fever take small-pox.

To those who object to vaccination, on the ground that since its introduction there has been an increase in the mortality from typhoid fever, I would remark, that as the infantile population (thanks to vaccination) is no longer decimated by epidemics of small-pox, the representatives of the children who used to die in childhood, grow up, to run the risk of all the diseases incident to adolescence and manhood, a circumstance which would explain why typhoid fever may perhaps be more frequent now than formerly.

Should the day ever come when we shall have the good fortune to discover such prophylactics for measles and scarlatina as cow-pox is for small-pox, there will perhaps be people who in their turn will

try to show that measles and scarlatina are necessary maladies, the prevention of which occasions the development of new diseases. Such individuals would not be more mistaken than those whose theories regarding cow-pox we have now been refuting.

If these gentlemen were logical in their reasoning, they would hold that the more severe small-pox is, and the more copious the eruption, so much the more complete will be the depuration of the organism, and so much the better protected will the economy be from the diseases from which small-pox exempts:—consequently, that the confluent is the most desirable form of the disease!

It appears, then, that no charge can be substantiated against cow-pox, that the verdict must be in favour of it as a prophylactic against small-pox, and that the discovery of Jenner must remain unchallenged as one of the greatest benefits conferred by medicine on humanity. The only reproach which can be adduced is that the prophylactic power of vaccination has in our day too often become unreliable, and is gradually diminishing. On that account, adopting in principle the opinion of Gregory, I would prefer variolation to vaccination; but nevertheless, it is to the latter we must have recourse, for reasons which I laid before you when discussing the inoculation of small-pox.

LECTURE IV.

CHICKEN-POX.

Chicken-pox, or Varicella, essentially different from Modified Small-pox.—Unlike Small-pox it does not protect from Variolous Contagion.—Small-pox does not protect from Chicken-pox.—Course and Characteristics of the Eruption.

Gentlemen:—If I concur with the general opinion of physicians in believing that small-pox and modified small-pox are identical, I am not at one with them as to the nature of chicken-pox, or flying small-pox [*petite vérole volante*] as it is still very commonly designated. You will read in books, you will hear it said and repeated, that varicella is only a modification of variola; that chicken-pox and modified small-pox are identically the same disease; and that both are merely different forms of small-pox. You already know my opinion on this subject: with many others I hold that chicken-pox and modified small-pox are as much strangers to one another as small-pox is a stranger to measles; that they resemble one another as little as measles resembles scarlatina; and that they are as different as possible from each other in their symptoms, forms, and essential nature. And I will venture to affirm, that physicians who maintain an opposite opinion have never taken the trouble to examine chicken-pox; for if they had, they must have become convinced of their error.

Chicken-pox looked at from a general point of view, as an abstraction deduced only from its anatomical characters, presents such sharply marked differences from modified small-pox that it is difficult to understand how the two diseases should have been confounded. Then, on the other hand, we learn from the history of epidemics that chicken-pox can exist in an epidemic form by itself, whereas modified small-pox never prevails without being accompanied by normal small-pox. Again, the two diseases differ in respect of the

age of the person for whom they have a predilection. Small-pox before the discovery of vaccination and prior to the practice of variolous inoculation, while it chiefly attacked children, likewise attacked adults, whereas chicken-pox was then as now almost limited to young subjects, not attacking adults, who had escaped it in their youth. As inoculation in England, Germany and France dates from last century, as vaccination was not in common use till the beginning of the present, cases of modified small-pox were very rare in those days: but at that time chicken-pox was perfectly known and described. Except in exceedingly rare exceptional cases, small-pox does not attack a child vaccinated two or three years previously. You may with impunity inoculate such a child. But if you bring him into contact with another child who has chicken-pox, he easily takes it. From this fact alone, it is evident that chicken-pox is not small-pox. Again, if a person who has just had chicken-pox is brought into contact with a centre of variolous contagion, he ought not to contract small-pox if the chicken-pox of which the marks are still visible were the remains of modified small-pox; but nevertheless we have learned from experience that such an individual may quite well contract small-pox.

The two exanthematous diseases may even go on simultaneously. Dr. Delpech, in a paper published in 1845, narrates the case of a child who had had at the same time small-pox and chicken-pox.

A person will never contract small-pox from being exposed to the contagion of chicken-pox. Will there be a similar immunity if you inoculate an individual with virus taken from the mildest possible case of modified small-pox? Again, small-pox presents itself under very variable forms, but chicken-pox is always the same in form and symptoms: in no case does an antecedent attack of small-pox exercise the slightest influence upon it. Moreover, while second attacks of small-pox occur only as exceptional cases, second attacks of chicken-pox are far from being so uncommon. Do not all these considerations clearly prove that *vérolette*—for this also is a name of chicken-pox—differs essentially from small-pox?

The differences between the two diseases come out still more strongly when we examine them more minutely, comparing chicken-pox with modified and with natural small-pox. In distinct small-pox, as I have reiterated on several occasions, the fever of invasion lasts for three days, and the eruption appears on the third: in modified small-pox, distinct or confluent, the period of invasion has the same

duration as in the natural form of the disease. The course of chicken-pox is quite different. To-day, a child is seized with headache, feelings of general discomfort, and all the symptoms which accompany the onset of any fever; but on the very same day, before twenty-four hours have passed, there are visible on some part of the body—it may be on the face, back, abdomen, or legs—small slightly acuminated rosy spots resembling the rosy lenticular spots of putrid fever. During the first twenty-four hours, from ten to fifteen such spots may be seen. The fever, nevertheless, continues. On the following day, from one hundred to one hundred and fifty spots may be counted: those of the previous evening have by this time elevated the epidermis, the elevations being generally in the form of blobs, which are sometimes rounded in the most perfect manner and contain a serosity transparent like rock-water, and without any surrounding inflammatory areola. This description is quite inapplicable to the natural variolous eruption: it is also inapplicable to the manner in which the eruption of modified small-pox appears in respect of situation, development, and form. The eruption of modified small-pox—unlike that of chicken-pox—bears no resemblance to a phlyctæna, a blob of pemphigus, or to certain forms of herpes. These palpable anatomical characters are in themselves sufficient to establish categorically the differences which so clearly distinguish the two affections from each other.

Next morning, there is almost no fever, and it is observed that a new crop of from one hundred to one hundred and fifty spots have appeared during the night. In the evening of this day, fever again sets in, and continues till next day, when the spots of the previous evening have become blobs, and new spots appear (without indicating a preference for any particular locality), in the situations where the eruption had already come out. Successive crops of eruption, and new onsets of fever, sometimes violent, occurring during the night and ceasing during the day, are repeated for four or five nycthemera. The fever, therefore, has no resemblance to the variolous fever, which is continuous, and usually during a single paroxysm brings out the eruption however generally distributed it may be over the body.

After four or five attacks of fever, the eruption of chicken-pox is complete, and there is no more fever. The rosy elevations, which after from seven to ten hours were transformed into blobs, perfectly round, shining, and distended with lactescent serosity, in from

twenty-four to thirty-six hours more increase in size, and become irregular in shape like some of the pustules of ecthyma; their serosity acquires an opaline appearance; and an inflammatory areola surrounds them. They remain in this state for about three days. Towards the third day, the serosity is replaced by pus: the pustule bursts: it is large, irregular, and painful. Thus, whilst from eight to nine days are required for the evolution of the variolous pustule, three nycthemera are enough for the blob of chicken-pox. Farther, the variolous pustules are largest on the hands, but it is on the back and trunk that the varicellous pustules attain the greatest size.

On the seventh day, the pustules of chicken-pox are dry, and in their place are to be seen blackish crusts like those which succeed the pustules of ecthyma, or red spots such as are presented by imperfectly healed blisters, according as they have proceeded more or less freely to suppuration, or have broken the skin like a blistering plaster of cantharides or ammonia.

In chicken-pox, the eruption is in the form of blobs: in small-pox it is in the form of pustules. This important difference irrespective of other distinctive characteristics drawn from the general symptoms is quite sufficient to establish the non-identity of the two diseases.

The following case, for which I am indebted to M. Dumontpallier, furnishes me with additional evidence of the essential nature of the difference between small-pox and chicken-pox:—

"On Tuesday 4th March 1862," writes M. Dumontpallier, "I was called in to the family de R—. The eldest of the daughters, between thirteen and fourteen years of age, had been only slightly unwell from the previous evening, but nevertheless, at my first visit on the 4th March, I observed a vesicular eruption on the face, arms, legs and trunk. There existed slight lassitude, with some feeling of debility and pains in the limbs, a very little aching in the loins, no nausea, and hardly any fever. This young girl had beautiful vaccinal cicatrices. I diagnosed the case to be one of modified small-pox. The patient was soon restored to health; but she will retain one or two pock-marks on the face."

"On Saturday, 8th March, I vaccinated Miss de R—'s two sisters, aged respectively ten and twelve, and also Mrs. de R— and her brother a young man of twenty-three. A vaccinal pock was developed on the arm of Mrs. de R—, but in the two girls and the young man, the vaccination did not take effect. Matters remained

in this state till Monday 17th March, that is till thirteen days after the onset of the fever in the eldest of the three sisters, and nine days after the vaccination of the family, when I was sent for to see the two youngest sisters. I was told that both had had some feelings of discomfort on the previous day: during the day they had taken a walk, but in the evening had begged to be allowed to go early to bed. Next day, the 17th, a very beautiful eruption of papules, which soon became slightly vesicular, appeared on the face, limbs and back. On the following day, the blobs were filled with lactescent serosity, and soon dried up into the form of crusts. There was no severity in any of the general symptoms, and by the third day the appetite had returned."

"I called in Professor Trousseau in consultation, who had no hesitation in saying that it was a case of chicken-pox. He came to this conclusion from the short duration of the period of invasion, the vesicular form of the eruption, the rapidity of the desiccation, and the small amount of constitutional disturbance. It is evident, from the facts just stated, in the first place, that the Misses de R— were proof against the contagion of small-pox, for they were still under the protecting influence of a first vaccination; and in the second place, that small-pox and chicken-pox are diseases distinct from each other in their nature and in their germ, as the Misses de R— took chicken-pox, though proof against small-pox."

Chicken-pox sometimes presents phenomena which are never met with in small-pox. Thus, in an epidemic of chicken-pox which prevailed in the Necker Hospital, the fever ceased when the malady began; and during from fifteen to forty days pemphigoid blobs appeared on different parts of the body, leaving, on the surfaces which they had occupied, ulcerations exactly like those of pemphigus, which ulcerations continued for six weeks or two months. No such occurrences are ever observed in small-pox.

To sum up:—Epidemic conditions, general symptoms, the manner in which the eruption appears and its form, all combine to establish the essentially different nature of chicken-pox and small-pox. Again, chicken-pox is never a fatal disease. No physician has ever seen a patient die of chicken-pox, though of course there may be a fatal issue from some complication independent of the exanthematous fever. This cannot be said of small-pox nor of modified small-pox. Finally, the incubation of small-pox extends over nine, ten, or eleven days, as has been demonstrated in the practice of inoculation,

whereas the incubation of chicken-pox is a period of from fifteen to twenty-seven days. Chicken-pox is not inoculable, or at all events my attempts to inoculate it have been failures: but when a child suffering from it, returns to its family, we may prognosticate, from the teaching of experience, that within from fifteen to twenty-seven days other children in the house will have taken the disease.

LECTURE V.

SCARLATINA.

Variety in the Characters of Epidemics.—Contagion.—Incubation.—Complications at the Beginning of an Attack.—Characters of the Eruption.—Desquamation.

Gentlemen:—It is now nearly six months since we have been frequently receiving cases of scarlatina into our wards. In town, it seems to be prevalent as a somewhat severe epidemic. You have here at present, an opportunity of judging for yourselves of the strange forms which this disease is apt to assume. I am unwilling to allow the opportunity to pass without bringing it under your notice, as it is a malady rather imperfectly known by hospital students.

Scarlatina is more variable in its forms and symptoms than any other of the contagious exanthematous fevers; and its dangers are also more difficult to foresee. Small-pox, whether distinct or confluent, mild or malignant, is always small-pox: its leading characters can always be recognised—always, except with a very few exceptions, chiefly observed by our predecessors—its external anatomical lesions being peculiar to itself, whether it be in its natural form, or modified, as it so often is, by vaccination or a previous attack of small-pox. Scarlatina, on the contrary, may exist without showing itself on the skin; and when this is the case, the disease is not the less serious on that account. Measles always preserves pretty exactly its characteristic features: its diagnosis is usually, almost always, easy: its complications are generally foreseen, and occur at a certain stage, even on a particular day which the physician can predict. Scarlatina, as we shall see, presents complications which for the most part cannot be foreseen, and of which the most experienced practitioner can know nothing before-hand, even when they are imminent.

Scarlatina is sometimes so very mild, that Sydenham, one of the greatest medical observers of past times, said of it:—"Hoc morbi *nomen* (vix enim altius assurgit)." Sydenham gives us in his writings only the results of his personal experience, and as he had never seen severe scarlatina, he spoke of the disease with a sort of contempt which he was far from having for measles or small-pox. In our own day, some of the authors to whom we ought always to refer state, that for a long series of years the epidemics of scarlatina which came under their observation were so far from being serious that they were without fatal cases. Graves mentions that from 1800 to 1804 scarlatina ravaged Ireland and was very fatal; while from 1804 to 1831, the physicians who had found it so terrible in 1800, 1801, 1802, 1803, and 1804, saw scarcely any fatal cases, so wonderfully mild had been the disease. But in 1831, an epidemic of malignant scarlatina broke out in Dublin and its vicinity: in 1834, it covered Ireland with mourning more extensive than that which was caused some years later by typhus, or than that which had been produced two years previously by the outbreak of Asiatic cholera.[1]

At the commencement of my medical studies, when attending the clinic of Bretonneau, my illustrious master taught his class that scarlatina, which he had formerly heard spoken of as a very dangerous malady, was then a mild affection. He told us that from 1799 to 1822 he did not recollect having seen a single fatal case; and yet he had long practised in the country before he became first physician to the hospital at Tours. The numerous cases which he met with both in his hospital and private practice seemed at that time to have satisfied him that scarlatina was the mildest of all the exanthemata. But in 1824, an epidemic broke out in Tours and its environs: in less than two months Bretonneau learned that several patients had died with such frightful rapidity that—being opposed to the doctrines of Broussais then in repute—he blamed the treatment adopted by his colleagues, who bled most resolutely with a view to subdue the sore throat and the so-called inflammatory fever which attends the beginning of the attack. Bye-and-bye, coming personally to close quarters with the disease, he found that he could not always successfully contend against it, and he saw it carry off many of his own patients. The result was that Bretonneau who had formerly

[1] Graves: Leçons de Clinique Médicale. Traduit par Jaccoud, 2nd edition, T. i. Paris, 1863.

looked upon scarlet fever as a slight malady now learned to regard it as equally mortal with plague, typhus, and cholera.

Thus you see that during a quarter of a century, scarlatina appeared as an epidemic without showing any severity: then all at once it became changed in its manifestations, and cruelly smote all whom it touched. It is not usual for measles or small-pox to manifest themselves in this way. Very severe epidemics of measles and small-pox do, no doubt, sometimes occur, but as epidemics they never show such extremes of mildness and severity as scarlatina. Scarlatina is a disease which is more influenced than measles or small-pox by a dominating epidemic constitution, and hence it arises that an epidemic of scarlatina is sometimes very mild and at other times very severe.

You may have observed, gentlemen, with what care I have interrogated our patients with a view to ascertain the circumstances under which they contracted scarlatina. Causes which generally favour the appearance of other diseases have very little to do with the evolution of the exanthematous pyrexiæ, and in respect of their causation, contagion ought to be the point most particularly inquired into. We shall afterwards have to return to the consideration of the evolution of contagion-germs. I should fear that I was doing injustice to this great question were I only to skim its surface: I should, through my own fault, be unable to make myself understood by you. You have seen how much importance I attach to ascertaining the day of first contact, direct or indirect, with a contaminated person or place. You have seen that proof of this contact was sometimes clear, and that at other times it was quite unattainable, and also that there were cases in which communication between the patients and persons with scarlatinous infection had been such as to make it impossible to determine the duration of the period of incubation.

Nothing is more difficult than to state the exact time at which contagion has been contracted in an exanthematous fever, when the virus has not been directly introduced by inoculation; and consequently, nothing has been more variable than the manner in which this question has been solved. According to some the incubation of scarlatina varies in duration from three to five days, according to others it lasts for eight days, and some believe that it may be prolonged to fifteen, twenty, or even thirty days. In fact the figures given have been hypothetical. There exists an unwillingness to

admit the fact that it is impossible to determine the duration of the period of incubation, just because it is impossible to fix the date of its commencement. Small-pox is the only fever in respect of which this date is determinable with precision, being the only one directly inoculable. In consequence of variolous inoculation having during half a century been practised on a large scale throughout Europe, the time which elapses between the moment at which the virus is placed under the skin, and that at which the malady declares itself, has been determined with precision. The rigorous determination of the length of the period of incubation in small-pox is dependent, therefore, upon its inoculability, a property which does not belong to any other exanthematous fever. From the non-inoculability of the other exanthemata, it has been necessary to assume as the beginning of the period of incubation, the moment at which the patient was first in contact with an infected person. But inoculation and contact are not the same thing. Here is a case in point! Five hundred sheep are collected together in the same park, or in the same fold: one of them takes the tag-sore, an eruptive disease of sheep, analogous to small-pox in the human species. Fifteen or twenty days later, seven or eight other sheep are seized, and on each succeeding day several more fall sick. It is sometimes four months before the entire five hundred have taken the disease. Now, these animals contracted the contagion at very different periods, although they were all shut up in the same place, breathed the same impure air, were together in crowded contact, and soiled by the discharge from the sores of the affected. Is there any reason to suppose that the period of incubation was longer in some of these sheep than in others? None: because if all the sheep had been inoculated simultaneously, the manifestation of the disease would have occurred in all without exception on exactly the same day. Inoculation and contact, then, are two very different things: by inoculation, the virus is introduced almost of necessity into the system: but by mediate or intermediate contact, the absorption of the virus, its *conception*, if I may be allowed to use that expression, is not always secured—that only takes place when the economy is in a certain state of aptitude:—the way must be open so to speak. When absorption has once taken place, whether after inoculation or contact, it is probable that the evolution of the disease occurs within a determinate time, which, within a few days or hours, is the same in all cases.

Very well! Till we can inoculate scarlatina by the scarlatinous

virus, we shall be as unable to determine the duration of its period of incubation as we are to determine the duration of the incubation of the tag-sore contagion in the different sheep constituting the flock of five hundred. In a family consisting of ten individuals, five weeks will sometimes elapse before scarlatina has attacked all the members, the case being quite similar to that of the flock of sheep. This neither arises from certain individuals having been free from contact for a certain time, nor from the period of incubation having lasted longer in some than in others, but from the difference in the respective aptitudes of the different subjects to receive the contagium. This is what we see take place with syphilis. When the syphilitic virus is scientifically inoculated, it determines, after the lapse of a certain number of days, the evolution of a specific vesicle, and the number of days is almost exactly the same in every case; but when several men have connection with the same infected woman, some will take the pox immediately, while others, after having been exposed on several successive days to the contagion, will not contract the disease till the last day, or perhaps not at all. This is explained by the fact, that those who at once contracted the disease from the first contact were in a physiological and pathological state suitable for the absorption of the virus, while the others were not in that condition of aptitude.

To sum up:—The duration of the period of incubation in scarlatina, that is to say, the time which elapses between the exact moment at which the morbid poison is absorbed and the exact moment at which appear the first manifestations of the disease, cannot be rigorously determined in the present state of our knowledge. The same statement holds good in respect of measles.

Under very exceptional circumstances, however, it is possible to attain considerable exactitude as to the duration of the period of incubation in scarlatina. In the beginning of the year 1859, I saw a very curious case which occurred in the practice of my friend Dr. M'Carthy, who did me the honour of calling me in in consultation. A London merchant had taken one of his daughters to the Eaux Bonnes in the Pyrenees, and had passed the winter with her at Pau. On his way back to England, he stopped at Paris, where he wished to remain some days. His eldest daughter was keeping house for him in London. Impatient to embrace her father and sister, she started for Paris. When crossing the Channel, she was seized with fever and sore throat, and seven or eight days later arrived at Paris,

in the middle of a very serious attack of scarlatina. She alighted at the hotel, almost at the very moment when her father and sister arrived from Pau. The two sisters remained together in the same room, and in twenty-four hours the sister who had come from Pau showed the first symptoms of a mild attack of scarlatina. In London, the disease was then epidemic; but there were no cases at Pau. This curious history proves that in scarlet fever the duration of the period of incubation is sometimes not more than twenty-four hours. I am, however, very far from believing that that is its ordinary duration. Although the period of incubation is limited with precision in small-pox, there is probably no similar exactitude of limitation in the other exanthematous fevers.

The period of invasion in scarlet fever is quite as much without exact limits as the period of incubation. Recall to your recollection what takes place in small-pox. In normal small-pox, when the eruption appears within forty-eight hours of the first manifestation of symptoms, it may be affirmed that the case will be confluent, for, as a general rule, it is towards the end of the second day, or at the commencement of the third, that the pustules begin to come out in that form of the disease; and when the eruption does not appear till the fourth day, the diagnosis is—distinct small-pox. In cases of confluent small-pox, it is very unusual for the eruption to be retarded till the fourth day, and it is as unusual in distinct small-pox for it to appear on the second. Observe, that I am at present only speaking to you of normal small-pox. I was on a former occasion careful to point out that in the modified disease the symptoms are different.

In scarlatina, events do not proceed as in small-pox. In some cases, the eruption comes out during the first four or five hours of the fever, while in other cases there is no fever at the beginning of the disease, a fact mentioned by Heister and other old authors, and which in later times has been repeated by various writers. Barthez and Rilliet state that in eighty-seven cases observed, the eruption was the first symptom of the malady in four cases: in the majority of the eighty-four cases, the fever of invasion lasted twenty-four hours, and rarely continued longer. It is still more unusual, except in complicated cases, for the eruption to be delayed beyond the second day, and very much more unusual for it to be retarded till after the third day. Some physicians believe that they have seen cases in which the eruption did not appear till during the

third day. I do not absolutely deny the possibility of such an occurrence, but I say emphatically that the occurrence is one of extreme rarity. My opinion is, that in the class of cases referred to, the eruption is often not recorded because, though present, it has escaped observation, owing to its not having been looked for in the proper place. As a general rule, we first seek on the face for the eruption in exanthematous fevers, because, in point of fact, it first shows itself there in measles and small-pox; but in scarlatina, the eruption does not come out first on the face. It generally appears first on the trunk, fore-arms, lower part of abdomen, and bend of the thighs, and may exist in these localities from twenty-four to thirty-six hours before it is visible on the face or neck. Under such circumstances one might suppose that the eruption was only beginning to appear, when in reality it had been out for some time: but it is easy to avoid this mistake, if we are aware of the fact I have now mentioned.

There are, however, complicated cases of scarlatina, as of small-pox, in which the period of invasion is prolonged greatly beyond its ordinary term. It sometimes happens in seriously complicated cases of scarlatina that the exanthem does not show itself till as late even as the eighth day; as I know from the following case. Six years ago, I was summoned by my honourable colleague Dr. Sarrazin to see a child of six or seven years of age supposed to have cerebral fever. He was complaining of headache, and had vomiting. We observed squinting, slowness of pulse, stupor, and somnolence. From these symptoms we believed that the patient was suffering from inflammation of the brain and its membranes. I saw the child again on the fifth, sixth, and seventh days without changing my diagnosis, and continued to give a very unfavourable prognosis. On the eighth day, there appeared a well-marked scarlatinous eruption, accompanied by the usual sore throat: from that time, the cerebral symptoms entirely ceased. I have not seen another case like this in the whole course of my medical experience, but I know that similar cases have been observed by others. They are exceptional and very rare. As a general rule, I repeat, the period of invasion is very short in scarlatina.

The symptom which generally characterises it is fever with or without previous rigors: in the last patients you have seen in the wards, these rigors were absent. The pulse is quicker than in the other exanthematous fevers. This is an important fact; for in

studying the disease in its component parts, in speaking of scarlatina without eruption, we find that we often form our diagnosis solely from this extreme frequency of pulse, which is very rarely met with in other affections liable to be confounded with scarlatina. Diarrhœa and vomiting often accompany the fever of invasion. The sore-throat almost always shows itself simultaneously with the fever: this is the symptom to which the patient first calls the attention of the physician, and it therefore takes a very important place in the diagnosis. The tongue has no characteristic appearance on the first day: it is febrile, that is to say coated with a somewhat slimy fur, and scarcely red at the point and edges. On the veil of the palate, however, there is already perceptible a rather bright redness, and sometimes a dotted appearance. This redness is very distinct upon the tonsils, which are slightly swollen.

When the type of the disease is malignant, the symptoms assume a totally different form. There is a frequency of pulse still greater than in simple cases; and sometimes in adults from the first day of the fever, even before there is any appearance of eruption, the pulse is 130, 140, 150, or even 160. Disturbance of the nervous system at the same time supervenes, in the form of great restlessness, convulsions, invincible insomnia, and delirium, or at least a muttering delirium when the patient is left alone. Such symptoms are very unusual in simple sore throat or pyrexiæ other than scarlatina. From its first day, nay even from its first hours, malignant scarlatina makes itself known in all its malignity, and this malignity may be so intense as to carry off the patients within the first twenty-four hours.

I was summoned by my friend Dr. Bigelow, to see a young American lady at a boarding-school near Paris. From morning, she had been in a state of frightful delirium: she had incessant vomiting, intense fever, a pulse too frequent to be counted, and an extreme dryness of skin. On seeing the patient, I was led by these symptoms to pronounce the illness to be scarlatina; and although there was nothing else to demonstrate its existence, my diagnosis was confirmed by the presence of the characteristic scarlatinous eruption in another young girl in the same boarding-school where the disease was at that time epidemic. Our patient died before the close of the day.

In 1824, at the commencement of that disastrous epidemic which desolated Tours—and of which I have already spoken—I saw,

along with Bretonneau, a young woman die in eleven hours with symptoms of the most terrible description—delirium, excessive agitation, and an extraordinary acceleration of pulse. There was nothing else to indicate the nature of the disease, except that we were then in the middle of an epidemic of scarlatina, and that several members of this young lady's family had taken the disease.

Under similar circumstances, during an epidemic of scarlatina, particularly when the disease has already attacked persons in immediate communication with your patient, be very guarded in your diagnosis, if the case present cerebral symptoms. Be specially guarded, if such symptoms declare themselves at the beginning of the illness, as they then almost always announce that the malady is malignant scarlatina, which with very few exceptions proves rapidly fatal. I must insist upon this point, as inattention to it will cause most serious errors of diagnosis, and give rise to mistakes in prognosis exceedingly injurious to the reputation of the physician. People forgive us more easily for allowing our patients to die, than for having made a mistake as to the issue of an illness. The very great importance of these precepts has been emphatically proclaimed by Hippocrates in his first chapter on prognosis.[1] He says:—

"To my mind he is the best physician who knows before hand what is going to happen. By penetrating into, clearly describing the present and the future of the maladies of his patients, and explaining symptoms which they omit to state, he will gain their confidence. Convinced of his superior intelligence, they will unhesitatingly place themselves under his direction. It is impossible to restore every patient to health, but the prediction of the succession of symptoms will be even more highly appreciated. It is of importance to recognise the nature of similar affections, to know the extent to which they exceed the constitutional power, and likewise to discern where there is any supernatural element in the disease; for that is a point which affects the prognosis. It is in this way that the physician will obtain the merited mead of admiration, and practise his profession with ability. Knowing the cases which are curable, he will be the better able to guard his patients from danger, by indicating the precautions to be taken against each untoward contingency: and by foreseeing and predicting fatal and favourable issues, he will escape blame."

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[1] Hippocrate:—Œuvres Complètes. Trad. Littré. Paris, 1840, T. ii, p. 111.

Such are the considerations which ought always to be present to your minds, and the full import of which you already understand.

But to return to our subject: when, during an epidemic of scarlatina, you meet with the formidable symptoms of which I have now spoken, give your opinions with reservations for the cases may perhaps terminate rapidly in death. Similar fatal symptoms almost never show themselves thus unexpectedly in measles or small-pox.

The temperature rises to a higher point in scarlatina than in any other eruptive fever. The skin of the patient communicates to the hand a sensation of the sharpest and most pungent heat. The thermometer placed in the axilla sometimes rises to forty-two or forty-two and a half degrees, which is the highest temperature ever observed in disease. The fever continues moderate, and the heat inconsiderable during the prodromous stage, but about twenty-four hours prior to the eruption, the temperature rises suddenly to a high point, at which it remains during the development of the exanthem. The maximum of the eruptive process corresponds exactly with the maximum of temperature: this is the reverse of what occurs in small-pox, in which there is a diminution of temperature proportionate to the evolution of the exanthem. In scarlatina, the abatement of heat, in place of being rapid as in small-pox, is gradual, steady, without exacerbations, and is not completed till from four to eight days have elapsed.

I have endeavoured to point out to you at the bed of the patient, the characters of the eruption, but I fear that I have not succeeded, notwithstanding the careful manner in which I have proceeded. Upon consulting certain books, one might suppose that it was impossible for a physician to have any scope for hesitation in the differential diagnosis of eruptive fevers. Measles is an eruption of small, isolated, irregular spots, with blank intervals between them. Small-pox is recognised by its small acuminated papules, which on the second day become vesicular; on the third, pustular; and about the eighth, umbilicated and surrounded by an inflammatory areola. These features are so well marked, that they cannot be mistaken. As to scarlatina, we are told that its characteristics are still more precise: it is a diffused scarlet redness of the skin occurring in patches. This is all very simple, but the description is far from an accurate account of what is seen in all cases. Indeed, I have shown you cases of measles in which the eruption was diffuse and

uniform, without intervals of unaffected skin. Such cases are certainly exceptional; but still there are such cases. On the other hand, we meet with cases of scarlatina, both distinct and confluent, with the eruption in some places in patches, or in numerous small, red, rounded points, perfectly isolated from each other, and devoid of that winy raspberry hue generally attributed to it: though differing in appearance from measles, it may be mistaken for that eruption. The eruptions most commonly mistaken for scarlatina are those to which I have already called your attention, as pretty frequently occurring at the beginning of attacks of small-pox, particularly of modified small-pox, and to which the epithets scarlatiniform and morbilliform have been applied.

Scarlatina is distinguished, at the first appearance of the eruption, from other eruptive fevers, by the redness of the skin being often accompanied by the millet-seed rash, which is almost invariably met with when the scarlatinous rash is confluent in ever so small a degree. The miliary eruption shows itself on the sides of the neck, on the chest, and on the lower part of the abdomen: it can be detected without being seen, by passing the hand over these parts from the little inequalities communicating the sensation of what is called goose-skin. When the inequalities are examined by the eye, a multitude of small vesicles are seen, which, at the end of thirty-six or forty-eight hours, are filled with a lactescent fluid.

The scarlatinous eruption itself is not really constituted by one uniform blush as in erysipelas, but by an infinite series of small red elevations of the skin resembling the vesicles of a very closely placed eczema. The elevations can be recognised by the touch, and the correctness of their description now given can be verified by using the magnifying glass. It will also be seen that the small elevations rest upon a rosy basement. The intensity of the redness of the skin is greatest on the neck, chest, abdomen, and internal aspect of the arms and thighs. When strong pressure with the finger is made on the parts occupied by the eruption, or when a pencil is drawn over the skin, as if to mark a line, the redness gives place momentarily to a white line across the red; on the removal of the pressure, the redness rapidly reappears. This fact did not escape the notice of our predecessors, and you will find it clearly stated by Borsieri. The eruption comes out everywhere pretty nearly at the same time, but is generally visible on the neck and chest before it shows itself on the face. The character which it presents on the face and trunk

is similar; it is streaky, with a bright red in some places alongside of white streaks: on the face, which is swollen, the skin seems as if it bore the marks of a smart slap with the fingers of the open hand: there is swelling of the hands and face, as well as of the face. The swelling, which shows itself with the eruption, also increases along with it, and is therefore most conspicuous about the second or third day. The tumefied condition of the hands is very obvious to the sight, impedes the movement of the fingers, and prevents the patient from closing the hand. The swelling keeps pace with the eruption, and generally disappears at the same time from the face and extremities. The swelling I am now speaking of must be very carefully distinguished from scarlatinous rheumatism, which I shall have forthwith to bring under your notice.

When we look at the patient's throat, we find that it is of a bright red colour, and that the veil of the palate and tonsils are swollen; the latter very often present small whitish concretions, the earliest manifestation of the membranous sore-throat of scarlatina.

The aspect of the tongue, already described, is so essentially specific, that it is in itself sufficient to enable one to recognise the existence of scarlatina. Nothing like it is ever met with in measles or small-pox. It is as specific in scarlatina as are pustules on the mucous membrane of the mouth in small-pox. On the first day, there is only a slimy fur, more or less thick, more or less white, and which if the patient has vomited has a yellow or green colour: at the point and edges, there is only a slight redness. On the second day, the redness increases in intensity and in extent: and this change continues to proceed on the third day. About the fourth or fifth day, the saburral coating has almost or altogether disappeared: the whole tongue is then scarlet and swollen, and the papillæ rise above the level of its surface in such a way as to give it a strawberry-like aspect. This appearance is produced by the tongue being denuded of its epithelium: we can sometimes see this desquamation in progress, and can even accelerate it by gentle rubbing with a bit of linen cloth. This is a constant phenomenon in scarlatina, except when there is an absence of fever; and nothing like it is met with in measles or small-pox, even when in the latter there is stomatitis. About the seventh or eighth day, the tongue, whilst it retains its red colour, becomes smoother: about the eighth or ninth day, the restoration of the epithelium commences very perceptibly, being at first exceedingly thin, then of the thickness of onion-peel and about

the twelfth day, it has nearly regained its normal thickness, but the mucous membrane still remains redder than natural.

In studying the relation which the severity of the disease bears to the intensity of the eruption, it becomes obvious that some authors have in respect of this subject fallen into a capital error liable to lead astray those practitioners who are not familiar with scarlatina. These authors say that when the eruption is full-blown, bright, and well come out, (to use the common phrase) the patient is in less danger of serious complications. The opposite of this position is the truth. In scarlatina, as in small-pox, the more intense the eruption, in the same ratio, the more severe is the disease. In non-confluent scarlatina, the danger is usually less than in confluent, just as the danger is less in distinct than in confluent small-pox. In both of these exanthematous fevers, in proportion to the intensity of the eruption is the severity of the symptoms and the peril to the patient: this proposition is established by what has been seen in the course of epidemics, and you have an opportunity of verifying it for yourselves by the observation of patients in the wards. The proposition, however, is not absolute. In scarlatina, as in small-pox, if the eruption is checked by some serious antagonistic determination, by profuse hæmorrhage, by great disturbance of the nervous system, it comes out badly and incompletely.

Scarlatina, as I said in beginning my lecture, is not always like itself; it is identical in its essence, but very dissimilar in the forms which it assumes. In some cases, after ten or twelve hours of fever, an insignificant eruption appears on the neck and trunk, and in two or three days the slight febrile excitement by which it was accompanied disappears, the patient having scarcely experienced any discomfort. Desquamation proceeds by small stripes or patches, and sometimes in a manner hardly perceptible: in five or six days more the patient is restored to perfect health. If he avoid exposure to cold and other acts of imprudence, the whole affair is at an end. The malady has been of so simple a character, that it might have run its course unnoticed.

Between the very mild and the very severe, the two forms, which I have had principally in my eye when sketching the leading features of the disease, all intermediate forms are met with; and there is besides, that terrible scourge, malignant scarlatina, than which no pestilential disease is more formidable.

Desquamation in scarlatina is not very well understood by the

majority of physicians. This morning I showed you two women, in one of whom, though at the seventy-second day, it is still going on: in the other, at the thirty-fifth, it is in full activity. The red colour of the skin generally disappears with greater or less rapidity before desquamation commences, but it begins sometimes in various parts of the body while the eruption is still visible. It begins on the neck and chest between the sixth and ninth days: it then proceeds on the limbs, then on the hands (first on the back and then on the palms), and last of all on the soles of the feet. On the whole body, desquamation presents special characters, but they are more distinctly marked on the hands and feet than elsewhere. On the trunk, the scales are tolerably large, often, it is true, not being more than two or three millimeters in breadth, but at other times measuring from one to two centimeters. On the arms and legs, where the epidermis is a little thicker, the desquamative plates have sometimes a size of four or five centimeters, and they can be stripped off in broad bands, as is the case after erysipelas and inflammation of the areolar tissue. Scarlatinous desquamation never assumes the furfuraceous form, as in the desquamation which follows measles. In measles, the bran-like scales are so small that unless you look at them very closely, you cannot see them, and it even often happens that this white, dry epidermic dust, resembling flour in appearance, is only observable upon brushing the skin of the patient with the sleeve of the coat. In scarlatina, the desquamation of the hands and feet has too significant an appearance to be mistaken. The epidermis peels off in irregular flakes, variable in size, and sometimes very large like pieces of a glove. From the feet, where the process goes on most slowly, the detached flakes are still thicker than those which come off the hands, and in some cases the nails, which as you know are prolongations of the epidermis, fall from the toes. This is a rare occurrence, but it has been observed, and one example of it is recorded by Graves.

In concluding my remarks on the subject of desquamation, let me add that Wunderlich has observed a considerable elevation of temperature during the process. This is not what we should expect, and is the reverse of what we meet with in small-pox. To me, it seems to prove, that the fever is far from being ended when the more palpable symptoms of the disease have ceased; and as the morbific action is not completely exhausted, one can to a certain extent understand the development of those formidable complications

which insidiously supervene during this period, and of which I shall have much to say bye-and-bye.

Cerebral and Nervous Complications.—Sore Throat, Complicated with Diphtheria.—Buboes.—Rheumatism.

The most striking as well as the most alarming phenomena in scarlatina are the nervous symptoms which are liable to occur. Their intensity is a peculiar feature in this disease, and in most cases they suffice to establish the diagnosis between it and the other exanthematous fevers. We hardly ever meet with serious cerebral disturbance in the beginning of an attack of measles or small-pox, with the exception of epileptoid convulsions, which are not very unusual at the onset of both of these diseases, particularly in children; but as ultimately, when the eruption appears, there is not even a possibility of any confusion except between measles and scarlatina, the intensity of the nervous symptoms in the latter constitutes the capital circumstance which determines the differential diagnosis.

In scarlatina, nervous symptoms set in from the very first: during the first day there is delirium. I am now speaking of what takes place in the severe forms of scarlatina, for in the mild forms, we only meet with disturbance of the nervous system in exceptional cases. In very severe scarlatina, delirium seldom fails to occur, and in the worst cases, it is as formidable as in typhoid fever of the most aggravated type: it declares itself simultaneously with the appearance of the exanthem, and often continues up to the period of desquamation, or, to speak more correctly, till the subsidence of the fever.

There are other forms of nervous disturbance met with in scarlatina besides those which are indicated by the terms *carphologia, jactitation, coma,* and *coma vigil.* In a word, we meet with every form of typhic nervous disturbance. And in children, we also meet with epileptoid convulsions during the first two or three days of the disease, but less frequently than at the beginning of attacks of measles and small-pox, when, as I have already remarked, they are not uncommon. But convulsions in scarlatina have a much more serious import; for whilst they are considered by some authors, (among whom is Sydenham, from whom in this I dissent), when

occurring in small-pox as a favourable omen, and are generally looked on as having only a moderately unfavourable influence on the prognosis in the onset of measles, they always indicate considerable danger when they occur during the first or second day of scarlatina. They indicate still greater danger when they occur in the third stage of the disease, in connection with general œdema. I shall afterwards have to explain what they then imply, and to point out that they are almost invariably followed by a fatal issue. Even in adults there are examples of epileptiform phenomena. They occur about the second or third day of the disease, and principally in individuals subject to true epileptic seizures. These convulsions recur, they are followed by coma, and death may close the scene within twenty-four hours from their first manifestation.

Dyspnœa is another nervous complication which is important, and of sinister presage. The difficulty of breathing of which I speak is quite unconnected with any appreciable lesion of the lungs, and in this respect, as well as in the sadness of its meaning, resembles the same symptom so often met with in many septic diseases, in puerperal typhus, in camp typhus, and in cholera. You saw a terrible example of this kind of dyspnœa in a recently delivered woman who was carried off by scarlatina with fearful rapidity, and the history of whose case I shall recall to your recollection, when we come to consider the subject of treatment.

Besides the nervous symptoms dependent upon disturbance of the cerebral and spinal systems, there are others originating in the ganglionic system which I must now mention; and among which probably is the alarming dyspnœa I have just been speaking of. Every one is acquainted with Claude Bernard's remarkable inquiries into the functions of the great sympathetic nerve: all know that when this nerve is divided, the parts to which its branches are distributed are not paralysed, but on the contrary manifest increased functional action in augmented calorification and secretion. The scientific professor of the College of France has shown that on cutting on one side the branches of the sympathetic which are distributed to the ear and face of the rabbit, the temperature of these parts rises to four or five degrees centigrade above the normal temperature, and above that of the corresponding parts of the opposite side where no section has been made. He has shown that by destroying the thoracic ganglia and the ganglia of the solar plexus, effects of increased vascularity are produced similar to those seen in

the experiments just mentioned, and causing violent inflammation: he has also shown that the secretions are greatly influenced by the ganglionic system. Applying to pathology the results of the physiological experiments, we come to the conclusion that when there is abnormal increase of temperature in an animal, there is more disturbance of the sympathetic than of the cerebro-spinal system. Now, there certainly is no disease attended by so great a general elevation of temperature as scarlatina. When the centigrade thermometer is placed in the axilla, or is introduced into the rectum of scarlatinous patients, it marks forty or forty-one degrees. Dr. Currie has even noted 112° Fahrenheit, which is equivalent to forty-four and a half degrees centigrade. This increase of temperature can only be explained by a great disturbance and a very impaired power in the ganglionic system, a condition at the same time indicated by disorder in functions under the influence of the great sympathetic, as manifested in incessant bilious vomiting in the beginning of the disease, lasting sometimes for four, five or six days, and in intractable profuse diarrhœa which I have often seen.

It is essential to bear in mind that these morbid symptoms are not of an inflammatory character. If, under the influence of the notion that the dry burning skin is a proof of the presence of inflammation, we treat the vomiting and diarrhœa by antiphlogistics, we pursue the most pitiable and perilous course we could adopt. Of all the eruptive fevers, scarlatina is that which least demands the employment of antiphlogistics, a mode of treatment, which is also rarely beneficial in small-pox or measles.

There remains another complication to be noticed, viz. *hæmorrhage* from the mucous surfaces, and into the sub-cutaneous cellular tissue. When there is from the beginning of the attack a hæmorrhagic tendency, death is invariably the issue; while hæmaturia when observed, as it frequently is, in the course of the disease, and in conjunction with anasarca, is a much less evil omen. You have seen several patients restored to perfect health after having passed bloody urine for more than a fortnight. We shall afterwards return to this subject.

The *sore throat* of scarlatina is the next topic which presents itself. It is very difficult to understand well and describe well this affection. It seems, in general, sufficiently easy to point out its simple and its serious forms; but in respect of the latter there is one

form, which in its turn we shall have to study, in which this facility does not exist—a form in which diphtheria probably intervenes as a complication, to contradict the anticipations of physicians, and to impart to the sore throat a character of the most alarming severity. I have already established that the sore throat is an essential part of scarlatina. It is very rarely absent, even in the mildest cases, just as it is very unusual for measles, however mild, to be unattended by pain in the larynx. Sore throat is also met with in small-pox, for three or four pustules on the pharynx are quite enough to produce it; but there is a very marked difference between variolous and scarlatinous sore throat.

In scarlatina, from the first day of the attack, as I have already said, the veil of the palate has a red hue, analogous to, but deeper than, that of the skin: the tonsils are swollen, and of a purple colour. The fever continues its course, and after from two to four days, there often appear on one and sometimes on both tonsils small whitish concretions, generally of a milky whiteness, unless the patient has vomited, when they may be stained by the ejecta from the stomach. In minutely examining them, and raising them up with the handle of a spoon, we find that they differ from diphtheritic false membranes. The latter are generally yellowish white, adherent to the tonsils, and when seized with the forceps generally peel off in strips: the concretions are pultaceous, less adherent to the tonsil which they cover, devoid of the character of false membrane, and much more resemble the secretions which form on the surface of ill-conditioned ulcers. In point of fact, they are nothing more than a compound of epidermis and sebaceous matter produced by the tonsil, and not at all a pseudo-membranous secretion. Dr. Peter, indeed, has shown that the characteristic feature of pultaceous sore throat is an exaggerated production of epithelium, which by desquamating rapidly gives rise to the fibrinous-looking deposits. It is an affection, therefore, which has no relation to diphtheria.[1]

As the progress of the affection advances, its intensity may become so formidable as to embarrass both respiration and deglutition, but especially the latter. The drinks which the patient takes are returned by the nose, and the voice becomes nasal. The cervical glands, particularly those at the angle of the jaw, are swollen.

[1] Peter (Michel):—Article "Angines" in the Dictionnaire Encyclopédique des Sciences Médicales, T. iv, p. 707.

Without any medical intervention, or under very slight treatment, this kind of sore throat begins to abate in severity as the disappearance of the cutaneous scarlet eruption commences. The tonsils throw off the concretions, which leave behind them a red and sometimes excoriated surface; and the affection is cured. The throat and tongue, however, remain susceptible, and this increased sensibility is more persistent in the former than in the latter. This condition ultimately ceases after a sort of desquamation analogous to that which we see take place on the tongue. Such is the common, and simplest, form of the sore throat of scarlatina.

I have already told you that there are other more serious forms; and one of them, to which I have already referred, is according to my experience almost invariably fatal. To that form of sore throat I must in a very special manner direct your attention. Some individuals have scarlatina in a medium degree of severity: there is a little dilirium at night, and scarcely any other nervous symptoms: the pulse is rapid: the pain in the throat is moderate. On the eighth or ninth day of the attack, recovery seems a certainty: the fever has subsided, the eruption has disappeared, and the family has ceased to be anxious. In this propitious state of the case, swelling suddenly appears at the angles of the jaws, which not only takes possession of that situation, but extends to the neck and sometimes to part of the face: a sanious fetid fluid flows profusely from the nasal fossæ: the tonsils become very large: the breath exhales an intolerable smell: the pulse becomes small and suddenly regains its rapidity: the delirium reappears, and other nervous symptoms occur. Then, the delirium continuing, coma supervenes: at the same time, the skin becomes cold, the pulse acquires a more and more miserable character, and after three or four days of this state, the patient dies, sometimes sinking slowly, and at other times being carried off suddenly as if in a faint.

How are we to explain what has taken place? Has diphtheria supervened to complicate the scarlatina, and divert it from its proper course? The symptoms bear so strong a resemblance to the terrible forms of that frightful disease which carry off both adults and children before the affection has extended to the larynx, the false membranes still remaining localised in the nasal fossæ, ears, and throat—the symptoms so much resemble the rapidly fatal forms of diphtheria, that one is induced to believe that the case is no longer one of scarlatina, but that the other dreadful scourge has

come to destroy the patient. I am the more disposed to adopt this view, as under certain circumstances the larynx is invaded. Graves cites cases of persons dying of croup at the end of an attack of scarlatina, and also of persons recovering from the exanthematous fever after having discharged false membranes of tubular shape, moulded in the trachea. In mentioning these cases, Graves calls me to account for having mistaken this form of scarlatinous sore throat: and in proof of my having committed a mistake, he quotes my expression—"Scarlatina does not like the larynx." During my period of service at the Children's Hospital, I so often found such an extraordinary identity between the sore throat of malignant scarlatina and the sore throat of malignant diphtheria, that I became shaken in my opinion. At present, I cannot prevent myself from believing, though I dare not affirm it as a fact, that the symptoms now under consideration depend upon a complication with a formidable form of diphtheria occurring at the close of the attack of scarlatina. The patients certainly sink with all the symptoms of diphtheritic poisoning, such as a lowering of the general temperature, a small pulse, a fetor of the breath exhaling from mouth and nose, and a general paleness of the skin, a combination of symptoms not met with in any other serious disease. We can suppose, then, that in persons placed under certain conditions, as for example in a centre of epidemic diphtheritic influence, such as is, one may say, always dominant in hospitals for children, the scarlatinous sore throat may become the starting-point of a diphtheritic attack, exactly in the same way that a small excoriation behind the ear, an ulceration of the vulva, or any other solution of continuity existing in persons in the midst of erysipelatous epidemic influences, may become the starting-point of erysipelatous manifestations. A circumstance which tends to support me in looking at the facts from this point of view is this—that I can only recollect one case of recovery from sore throat supervening suddenly at the ninth or tenth day of an attack of scarlet fever. The patient who made this recovery was the daughter of my honourable friend Dr. Caffe. Now, in true scarlatinous sore throat, even of a serious character, beginning with the exanthematous fever, and reaching its maximum intensity on or between the fifth and eighth days of the disease, recovery is the rule, and generally takes place without the assistance of art.

When we come to consider the treatment of scarlatina, I will speak of the treatment of scarlatinous sore throat: in the mean time,

I will only remark that membranous scarlatinous sore throat runs a very different course from diphtheritic sore throat. Observe, I am not now alluding to the malignant scarlatinous sore throat, to which I directed your attention, but to the simple form of the affection, which, as I have already said, is almost always accompanied by pultaceous concretions. The diphtheritic affection has a tendency to spread to the nose and larynx, but the scarlatinous sore throat generally remains confined to the pharynx, and notwithstanding Dr. Graves's condemnation of the proposition, I still maintain, that *scarlatina has no liking for the larynx*. True scarlatinous sore throat, then, is pharyngeal, differing in this respect from the sore throat of measles, which is laryngeal, and from that of small-pox, which is both pharyngeal and laryngeal. The voice of scarlatinous patients, when affected, is snuffling, but its tone is sonorous: the voice does not undergo the modifications to which it is subjected in the other form of sore throat, when traversing the throat, nose, and mouth. In measles, it often happens, that the tone of the voice, very much altered during its formation in the larynx, undergoes no farther change in traversing the back part of the throat.

In describing the eruption, I noted that the swelling by which it is accompanied impedes the movements of the fingers and toes; but a congested state of the integuments is not the sole cause of the complaints which the patients make of this description of embarrassment: it may also be dependent upon *rheumatism*, another complication of the acute stage of scarlet fever. Scarlatinous rheumatism is, at least in adults, a very common epiphenomenon, and we have at present two patients suffering from it. The nature of the affection is often mistaken from the absence of the general symptoms of ordinary rheumatism, and from the rheumatic manifestation being confined, in the majority of cases, to three or four joints, particularly to those of the hand and wrist. The patients complain of very little else, and unless attention is directed to this particular condition, its existence may remain unnoticed. By minute interrogation, by carefully examining and applying a certain degree of pressure to the joints, articular pains are found to be present in perhaps a third of the cases. It is important to know this; for acute affections of the joints, general arthritis, pericarditis, and endocarditis frequently occur during the course of the disease. Graves has called attention to these complications. I have observed them. They seem to be of the nature of rheumatism. St. Vitus's dance is

sometimes, in children, a consequence of scarlatinous rheumatism, I shall return to that subject.

Engorgements of the glands, true *scarlatinous buboes* occur sometimes towards the close of an attack of scarlatina, about the decline of the eruption. They are met with in different situations, but chiefly in the neck. All pestilential diseases are accompanied by buboes. For example, dothienteritis has its mesenteric buboes: for, as you are aware, about the ninth or tenth day of that disease, the mesenteric glands may become so enormously large as to equal in size the egg of a pigeon. Scarlatina which is likewise a pestilential disease has also its buboes. The cervical region is their principal seat, and their evolution is contingent upon the lesions of the throat. From the very beginning of the disease, swelling of the glands is observable in both sides of the neck and at the angles of the jaw. Sometimes the cervical glands suddenly become the seat of inflammation, about the tenth or twelfth day, independent of the effects of the severe form of sore throat of which I have spoken. The skin becomes red and tense, and in four, five, or six days, there is formed an abscess of greater or less size, from which, if opened, pus issues. The cellular tissue surrounding the glands is in some cases sphacelated. I recollect a lad of fourteen years of age, in whom the gangrenous condition was so extensive that the muscles of the neck were dissected, as occurs in diffuse phlegmonous inflammations, showing the carotids pulsating at the bottom of a horrible wound. The patient recovered, but a hideous deformity remained as a consequence of the gangrenous destruction of tissue. A similar case is described by Graves.

Analogous lesions may occur in parts of the body where there are no glands, or at least where they do not seem to have been the starting-point of the mischief. In the lad whose case I have just detailed, besides the great abscess in the neck, a diffuse phlegmon appeared in the leg, on the tenth day of the attack of scarlatina: it caused considerable shortening of the tendon, and left such an amount of permanent lameness as was sufficient to exempt him from military service, when he was drawn in the conscription six or seven years afterwards.

Scarlatina may cause, not only glandular engorgements, acute buboes, and diffuse phlegmonous inflammation of the cellular tissue during the active period of the disease, but likewise chronic engorgement of the glands. In children untainted with scrofula, we

meet with chronic glandular engorgements dating from the beginning of the attack of scarlatina, and continuing two, three, or four months after recovery. In persons of strumous diathesis these engorgements become king's evil [*écrouelles*], and in them the inflammation of the glands often terminates in scrofulous ulceration.

Complications occurring during the Decline of the Disease.—Anasarca.—Hæmaturia.—Albuminuria.—Convulsions.—Œdema of the Glottis.—Pleurisy.—Pericarditis.—Endocarditis.—Rheumatism.—Scarlatina Without Eruption.—Anasarca Without Eruption.—Treatment.

We have still to study, on the one hand, the complications which supervene during the period of the decline of scarlet fever; and on the other, to consider the disease in its rudimentary forms, by which term I am far from meaning its simple forms, but the forms which it assumes when its usual characteristics are absent, when it is, as in many cases, so disfigured that we cannot recognise it except by the exercise of an exceedingly minute attention. This is undoubtedly the most important part of the history of scarlatina—less important, however, from a nosological than from a practical point of view.

The complications of the period of decline may be divided into two groups; first, the *immediate;* and second, the *mediate,* or those which occur much later than the immediate.

In the decline of the disease, we may still meet with nervous complications. An individual recovers from scarlatina: he is convalescent, and you have ceased to be anxious about him, when fits of vomiting suddenly occur, like those which ushered in the original seizure: the vomiting is accompanied by delirium, alarming restlessness, and great frequency of pulse, the patient ere long dying comatose or in convulsions. Nevertheless, there is an absence of anasarca, albuminuria, hæmaturia, and of everything which could lead one to anticipate the symptoms just enumerated. Complications of this kind are met with in adults as well as in children. Occurring during the wane of the disease, they have a much more unfavourable meaning than when they appear in the first stage, though they are then of very serious import. I cannot, therefore, too often repeat, that we ought not to look upon patients as recovered from scarlatina till long after the cessation of the last of the morbid phenomena. There is no other disease which so greatly

foils the physician, and so completely throws him out in his calculations. The fever is at an end, and there is nothing wrong to be seen except some symptoms which in appearance are very slight. You state that recovery has taken place; but nevertheless the malady may remain unconquered, and may carry off the patient with great rapidity at a time when there no longer seemed anything to fear.

Anasarca is one of the *immediate* phenomena of the wane of the disease which ought most particularly to engage our attention. It is met with in cases of medium severity, rather than in those of the most serious forms of scarlatina. It not only occurs in convalescent patients who have been exposed to cold, who have committed some imprudence, such as an error in diet, but even in those who have been constantly surrounded with every possible care, and watched with unremitting solicitude. MM. Barthez and Rilliet have noted that this symptom was present in one fifth of their cases. It never appears till fifteen or twenty days after the eruption, and I have seen it supervene a month after the eruption was entirely gone. Anasarca generally sets in suddenly. It invades the face, and every part of the body. It sometimes happens that a child whom, at our evening visit, we left lean and wretched looking, appears quite plump on the morrow, in consequence of turgescence caused by infiltration of the subcutaneous cellular tissue. This turgescence sometimes attains its maximum in twenty-four hours: it is generally universal, and much greater in degree than when the anasarca is dependent on organic affections of the heart, or on Bright's disease. But there are cases in which it shows very little, and is limited to the face and extremities. The anasarca is associated with a remarkable paleness of the skin, and is almost always preceded or accompanied by hæmaturia.

Hæmaturia is in point of fact a rather common occurrence in scarlatina, although it frequently escapes observation. If the blood passed is pure, or only slightly altered by admixture with the acids of the urine, which has then a black colour, the sanguineous character of the urine is recognised and pointed out by the persons in attendance on the patient; but it is not observed when, from the quantity of blood being less, the urine is rose coloured. The tint of bloody urine may be as greenish as whey, which has a tint essentially different from urine in Bright's disease, as well as from every other description of urine. During the first few days, the hæmaturia may be so great as to enable one to see blood at the

bottom of the urinal, and on pouring the urine into a test-tube, there will be perceived a precipitate of blood-globules occupying one or two centimeters. The liquid resembles a strong solution of rhatany. As the affection progresses, the urine assumes the colour indicated by this comparison, but the presence of blood can still be ascertained by finding altered blood-globules adhering to the sides of the test-tube, as well as by an enormous quantity of albumen being contained in the urine. When the urine is heated, and treated with nitric acid, we do not obtain a white albumen as in Bright's disease, but an albumen which is either of a brownish hue, or slightly stained in colour like that which we meet with in acute albuminuria.

Albuminuria—this acute albuminuria, generally transient, and in the majority of cases disappearing at the end of a fortnight or three weeks, sometimes even more rapidly, may pass into a chronic state, and become real Bright's disease. The acute symptoms have disappeared, and the economy seems to have returned to its normal state; but notwithstanding, on examining the urine from time to time, we find that it always contains albumen. When it is persistent in the urine for a month or six weeks, the symptom is very unfavourable. It shows that the kidney has begun to be infiltrated with fibro-plastic deposit, and that, sooner or later, the patient will sink under the progress of the new complication.

Anasarca, like the transient albuminuria which it accompanies, and to which it is related, is generally, but particularly by children, quickly got rid of with the aid of simple hygienical measures. But it sometimes happens that in spite of every care, this complication, particularly when it has come on very rapidly, carries off patients by producing effects variable in their nature, and which it behoves us to understand.

When anasarcous scarlatinous patients complain of sudden and violent headache, accompanied by disordered vision, *convulsions* are to be dreaded. It is necessary that you bear in mind this fact, both that you may inform the families of your patients of what may happen, and that you may use means to prevent the convulsions, which is sometimes possible. The measures occasionally employed with success consist in keeping the head in an elevated position, placing the patient so that his legs hang over the bed, and purging him somewhat briskly. But in the majority of cases, do what you will, the convulsions supervene, and often prove at once fatal. In

other cases, they recur at intervals of an hour and a half, of an hour, of half an hour, and then they become almost continuous, one fit beginning before the previous one is quite terminated, till at last the patient dies in a state of coma.

It sometimes happens that the anasarca gets possession of deep-seated parts. I have seen it seize the veil of the palate, the uvula, the epiglottis, and the arytæno-epiglottidean ligaments. In the child in whom we witnessed these lesions, symptoms of œdema of the glottis immediately set in; and it was only by an energetic cauterization of the upper part of the larynx that life was saved. My colleague, Professor Richet, mentioned to me his having been called to a child affected with this description of consecutive œdema of the glottis, in whom he was obliged to have recourse to tracheotomy to prevent impending death. For persons to be carried off in scarlatinous anarsaca by this affection of the respiratory passage is not uncommon: suffocation takes place all the more readily, that the throat having been previously in an inflamed condition, an extension takes place of the inflammation to the aryteno-epiglottidean ligaments, where it becomes the head-quarters of an œdematous turgescence; and also the more readily, that tumefaction of the pharynx complicates the swelling of the upper orifice of the larynx.

I have now to speak of some other affections which occur in the wane of scarlatina, which, though they begin to be better known than formerly, are still much less familiar to practitioners than the complications I have already described. I allude to malignant pleurisy, pericarditis, and rheumatism. The latter I have already referred to. In treating of eruptive fevers, it is usual to say that there is a peculiar tendency to thoracic affections in measles: the statement is correct, for measles attack the bronchial tubes first, and in preference to all other parts: it there declares its presence before anything can be seen on the skin, just as scarlatina makes its existence known by the sore throat prior to the appearance of the cutaneous eruption. The first symptom of morbillous fever is pulmonary catarrh, and hence it is easy to understand how this affection when more than ordinarily severe should pretty frequently give rise to inflammation of the lungs. Thus it happens that when the fever continues on the seventh or eighth day of an attack of measles, it is almost a certainty that the patient has either acute catarrh, pneumonia, or perhaps pleurisy. But authors are unanimous in stating that scarlatina has no tendency to attack the thoracic organs. In

truth, these organs are not assailed during the acute period of the disease; but they enjoy no such immunity when it is on the wane. It is not uncommon after scarlatina, both in those who are, and in those who are not affected with anasarca, to meet with the sudden occurrence of chest symptoms; but it is not, as in measles, the lungs which suffer, but the serous membranes—the pleuræ and the pericardium.

Pleurisy occurring as a complication of scarlatina is generally of a bad kind, not only in respect of the rapidity with which effusion takes place, but also in respect of the quality of the effused fluid. About the eighth or tenth day of the pleurisy, the effusion is often of a purulent character, as in puerperal pleurisy. This production of pus depends upon the fact, which we cannot explain, that there exists a condition of general contamination, in virtue of which scarlatinous inflammations have an extreme tendency to suppuration. At the Children's Hospital, I had occasion to perform paracentesis of the chest in a scarlatinous child who, so early as the twelfth day, had pus in the pleura. In another little patient, I performed the same operation at the twelfth day of the pleurisy, and withdrew seven hundred and fifty grammes of perfectly formed pus.[1] This child had become anasarcous without having had the eruption, but there could be no doubt as to the nature of the disease, as scarlatina was prevailing in the household. I shall have to say more regarding this case immediately.

In scarlatinous *pericarditis*, the tendency to suppuration is not so strong as in scarlatinous pleurisy. Scarlatinous pericarditis is also less frequent, and comes on more gradually. The relation which exists between inflammation of the pericardium and scarlatina was pointed out by Graves, and has been established in a very remarkable manner, especially by Dr. Thore, jun. He has shown that in a certain number of patients convalescent from scarlatina, some died from acute hydro-pericarditis, and others recovered after having had the same affection.[2]

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[1] Perfectly formed pus *weighing* 750 French grammes, may be estimated as *measuring* rather less than 1¼ British imperial pints.—Farther particulars of this case will be found at p. 191.—Translator.

[2] Thore, fils:—De l'Hydropéricardite Aiguë Consécutive à la Scarlatine, et de son Traitement. *Archives Générales de Médecine*, fév. 1856, 5me série, T. xii, p. 174.

Articular rheumatism, as I have already said, is an exceedingly common complication of scarlatina. We have seen it in the acute stage of the disease, and have met with it in adults in a proportion of cases greater than that in which it is generally believed to occur. We have also encountered it during the wane of the disease. The same occurrence was pointed out by Graves.[1] "In a great number of cases," he writes, "I have met with articular rheumatism as a sequel of scarlatina." Similar statements have been made by other reliable observers, among whom may be mentioned Drs. Pidoux, Murray and Valleix. The coincidence of rheumatism with scarlatina was nevertheless a generally forgotten fact, and consequently for several years past I have been constantly insisting upon it in my lectures. It is a singular eccentricity of scarlatinous rheumatism that it rarely assumes a formidable character: it is more localised, but less liable to return than ordinary rheumatism; when it has once left a joint, it seldom comes back to it: generally, it goes away quickly and spontaneously, without requiring any treatment. The manifestation of the rheumatic diathesis in scarlatina gives, however, up to a certain point, an explanation of the development of pleurisy and pericarditis: it assists us in understanding why these affections are as frequent as they are, and why it happens that *endocarditis* occurs as you yourselves have seen and as authors have stated. Generally speaking, in the first instance, scarlatinous rheumatism attacks the joints, and then the serous membranes of the heart and the pleuræ, but sometimes, like pure rheumatism, it seizes the thoracic organs at the first brunt, without touching the articulations. Sometimes also, it takes the terrible and pitilessly fatal suppurative form. In point of fact, it is as a sequel of scarlatina and puerperal fever that we see suppurative rheumatism. For the first few days, the affection appears to be mild, then the articulations become painful, intense fever sets in, delirium supervenes, ataxo-adynamic phenomena appear, and death closes the scene. On dissection, pus is found in the articular cavities and in the sheaths of the tendons.

Such are the complications of the wane of scarlatina which belong to the group we named *immediate;* the *mediate* complications come on at a much later period, and are linked with—are sequelæ of—those of the first group.

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[1] Graves:—Leçons de Clinique Médicale.

St. Vitus's dance is the most important of the mediate sequelæ of scarlatina. In children, you will see this affection following very close upon the exanthematous fever, showing itself in three months, two months, or even in six weeks. The remarkable researches of Dr. Germain Sée have thrown light upon the relations which exist between rheumatism and chorea.[1] His researches and later observations, including my own, justify us in stating, that it is unusual for children to escape St. Vitus's dance, who have had attacks of acute articular rheumatism; and to this statement may be added, as a sort of corollary to it, though requiring to be received less absolutely, that a child who has had St. Vitus's dance generally has rheumatism sooner or later. In chorea consecutive to scarlatina, the bellows-sound indicates the existence of cardiac lesions, the result of pre-existing endocarditis. And sometimes, the rubbing pericardiac sound, the last characteristic manifestation of scarlatinous rheumatism, points out to us that it is by the rheumatism that the convulsive neurosis is linked with the attack of scarlatina, and constitutes one of its mediate sequelæ.

You have often seen *suppuration* supervene in different parts of the body after exanthematous diseases: you have especially seen the boils, the superficial and deep abscesses which indefinitely prolong the convalescence of confluent small-pox, and endanger the life of the patient. You recollect a case which we recently lost, in St. Agnes's ward, from exhaustion caused by these colliquative suppurations.

After scarlatina, some of the mucous membranes, particularly those of the nose and ear, remain for months or even for years affected with chronic *eczema*. Some of you may very recently, and not without surprise, have seen me make a retrospective diagnosis of scarlatina from having before me eczematous coryza. The patient to whom I refer was a woman who came into hospital for a condition of general discomfort, characterised by excessive debility and absence of fever. She was affected with eczematous nasal catarrh. I observed that she also had on the elbows excoriations covered with crusts of comparatively recent date. I attributed the excoriations to violent rubbing, the rubbing to delirium, and the delirium to a fever. I further concluded that the fever was probably scar-

[1] Germain Sée:—Mémoires de l'Académie de Médecine. Paris, 1850, T. xv, p. 373.

latina, as that fever frequently produces delirium, and brings coryza in its train. In reply to my interrogations, the woman said that a month previously she had had scarlatina, which had been accompanied by delirium, and followed by general debility. My diagnosis was not the result of inspiration, but was a logical deduction from an association of ideas and a bringing together of phenomena. The lesion of the mucous membrane sometimes extends to the deeper parts, caries and necrosis of the bone taking place. Other consequences may also result, such as lachrymal fistula, perforation of the tympanum and loss of the small bones of the ear, caries of the petrous portion of the temporal bone leading to incurable deafness, facial paralysis, and, unfortunately in not a few cases, to inflammation of the meninges, and abscesses of the brain at points contiguous to the affected bone. These terrible occurrences sometimes follow measles, but not so frequently as they succeed scarlatina.

We have now come to that part of our subject which is the most difficult, and which is likewise, from a practical point of view, the most important. I refer to disguised scarlatina, to which I have given the name of *defaced* scarlatina [*scarlatine fruste*]. You know what an antiquary means by a defaced inscription; it is an inscription the greater part of which is obliterated, and of which there may remain only a line, a letter, or a point. Diseases, too, are defaced; or in other words they present nothing for the physician to read but a single word of the symptomatological phrase, and with this one word he has to reconstruct the entire phrase, just as the archæologist or the numismatist has to restore the effaced inscription by filling up the blanks in the remaining letters. Deciphering is a department with which the physician and the antiquary have to become acquainted by the use of very similar means: the antiquary must begin by learning to read what is written on well-preserved medals and unmutilated stones; and at the beginning of his studies, the student of medicine requires to recognise in a disease the aggregate of its characteristic symptoms, but by-and-bye, as the skilled antiquary deciphers a lost inscription by a remaining word or letter, so the student becomes a skilled physician, and will divine the whole nature of a disease from a single sign. Of all diseases, gentlemen, scarlatina is that which is most frequently defaced [*fruste*].

A case in point will be more useful than an elaborate description. In 1829, a friend wrote to inform me that scarlatina was prevalent

in a little village near Mennecy in the department of Seine-et-Oise, and that it was most severe in the communes of Villeroy Castle. I was particularly pleased to go to study this epidemic, as in consequence of the castle being perfectly isolated from the village, I could easily follow all the movements of the disease. I saw members of the same family who after having had sore throat without eruption, were afterwards proof against scarlatina, though surrounded by cases of various degrees of severity. Their sore throat had been of a very aggravated form, and accompanied by ardent fever: the redness of the pharynx was very characteristic, and the consecutive stripping of the tongue left no room for doubt as to the nature of the affection. I saw other patients who had the original disease apparently very slightly, as they had only drooped a little for eight or ten days, but who nevertheless afterwards became swollen, and passed blood with the urine. At that date, we were not acquainted with albuminuria. I was struck by the facts I have now stated; and I came to the conclusion that the persons who had only had eruption and consecutive anasarca, those who had only had anasarca, and those who had only had sore throat had all had scarlatina, the affections seen in all of them being manifestations of that disease.

At Meaux, in 1854, along with my accomplished friend Dr. Blache, I observed similar occurrences. A young girl fourteen years of age took violent scarlatina, characterised by atheromatous sore throat, intense fever and the specific eruption. Some days later, her sister, living in the same house, was seized with similar symptoms: almost at the same time, a lady's-maid sickened: two or three days afterwards, a valet, who had remained the whole day in the apartment with the invalids, became affected with violent sore throat accompanied by a deposit of pulpy matter on the tonsils, a red and subsequently peeled tongue, burning fever, but no eruption. It was evident to me that the family physician, Dr. Saint-Amand, was right in believing that all had had scarlatina: that the valet, being in the midst of the epidemic influence, had taken the fever like the other members of the family, but in a different form: in him, the inscription "scarlatina" was defaced, whereas in the other cases, it was complete. Another member of this household, a boy of six years of age, all at once, and without having had a moment's previous illness, became swollen. Dr. Blache and I were then called in in consultation. We considered the case to be one of scarlatinous anasarca coming on at the first brunt of the attack of scarlatina.

The anasarca was considerable, and accompanied by hæmaturia. The father and mother, persons very watchful over the health of their son, assured us that on the morning of the very day on which the boy became ill, he had taken his breakfast as usual: and the master of the boarding-school where he attended stated that he had played in his customary manner. In this case then, there was neither fever nor eruption, and scarlatina was detected solely by the individual symptom for which we were called in. Eight days later the boy had a double pleurisy: death was supposed to be impending, when Dr. Blache and I were again called in. We detected effusion in both pleuræ: four days later, we found that one side of the chest was restored to its natural state, and that the other was enormously distended. We proposed, and forthwith performed, paracentesis, withdrawing 750 grammes of pus. For two or three months Dr. Saint-Amand injected iodinous solutions into the pleuræ. Although the lung was perforated during the treatment, the child recovered, and at present enjoys most excellent health. I have not met with another similar case. But as regards examples of defaced scarlatina, you will find them scattered in the works of authors. Graves has in particular mentioned several, some of which I will now quote from his clinical lectures.

F— was taken home from a school, where scarlatina was prevailing: he complained of pain in the throat on swallowing, slight headache, and nausea. Next day, the tonsils were swollen, and there was increased difficulty in swallowing: the pulse was sharp, and the skin was hot, but there was no trace of eruption. These symptoms, without increasing in severity, continued for three days, and then disappeared. Before this boy had completely recovered, his father and two sisters took scarlatina. In the two sisters, the eruption appeared, and terminated in desquamation. In the father, there were only a few small red points on the skin, and no subsequent desquamation occurred.

O— likewise came home from school with scarlatina. During his attack his two sisters and brother took the disease. In the three it showed itself in the form of an eruption of small spots on the skin. At the same time, and in the same house, a valet and a lady's-maid were seized with very violent sore throat and high fever, which continued for some days: in neither case was there any eruption.

These cases of Dr. Graves are identical with others, which I have

met with. In the following very curious narrative relating to a physician's family, we see scarlatina showing itself only by anasarca at the onset of the illness, just as occurred in the lad whose case I described to you a few minutes ago. The facts were communicated to Dr. Graves by an eminent practitioner of Dublin.

Some years ago, scarlatina broke out in this practitioner's family. It attacked all his children with the exception of one young lady, who had no symptoms whatever of the disease, although she waited on her sisters during their illnesses. All was going on well, and the family was sent to the country for change of air: the sister who had not been ill went with the others. In the country, to the great surprise of all, this young lady was suddenly seized with that special form of anasarca observed in those who have had scarlatina. Her father, who attended her during her illness, was exceedingly struck with the occurrence: he observed the case with very special attention, and came to the conclusion that it was one of latent scarlatina.

Dr. Graves, in speaking of these cases, remarks that they are very interesting in a pathological point of view, as tending to prove that diseases originating in contagion very often do not exhibit their ordinary series of characteristic symptoms.

The quotations now made from the Irish author show that similar phenomena occur under the Dublin and under the Parisian sky. You will assuredly meet with these cases of defaced scarlatina; and you will do well to accustom yourselves to recognise them. Graves maintains that they can only be cases of scarlatina, because the disease being essentially contagious, it is impossible for the persons who have only had sore throat or anasarca to be in the midst of their scarlatina-stricken families, and yet be the only ones who have been exempt from attack.

In December, 1860, I saw with my friend Dr. Léon Gros, a young man of fifteen whose case furnishes us with a new example of defaced scarlatina—a case in which the diagnosis would have been impossible without assistance from accessory circumstances. This youth came home from college with a little fever and an insignificant sore throat. The illness was so slight that Dr. Gros did nothing; and after two days of trifling indisposition the patient was quite well. A few days afterwards, his younger sister took scarlatina; and during her convalescence, the brother was seized with hæmaturia which continued more than a month. I never entertained the

least doubt that this young man had communicated scarlatina to his sister, and that his hæmaturia was the sequel of his slight febrile attack. Dr. Gros did not feel quite sure as to the accuracy of this view. The young man did not contract scarlatina after his sister, and must have had it before her, if he can be said to have had it at all. In this case, albuminuria continued for nearly a year; and it required the most assiduous and skilful treatment on the part of Dr. Gros to prevent the patient becoming a victim to an exanthematous fever which had begun so mildly as to make its very existence a matter of doubt.

Eruptive diseases have a fatal tendency in this sense, that they have determinate characteristics against which we cannot prevail. This remark is equally applicable to diseases in which the eruption shows itself on the skin, and to those in which it comes out on the mucous surface of the intestine, as in dothienteritis or putrid fever, which is an eruptive affection of the alimentary canal. In treating these diseases, the physician must not lose sight of the great practical fact that it is impossible to stop the progress of a putrid fever, and equally impossible to cut short an attack of small-pox or measles. It is possible by injudicious treatment, at great peril to the patient, to retard, and in some degree to modify the appearance of the eruption, but the evolution of an exanthematous fever cannot be prevented. *Treatment* ought therefore to be restricted to the alleviation of the symptoms and complications which arise during its course. The physician ought in this class of diseases more than in any other, to be the servant and interpreter of nature—*minister naturæ et interpres*—for, to continue the quotation,—*quidquid meditetur et faciat, si naturæ non optemperat, naturæ non imperat:* he ought to remain passive when things take their regular course. If no untoward symptoms occur, there is nothing for him to do but to fold his arms, for at the end of a few days the malady will have safely run through all its stages. Even when eruptive fevers assume some threatening symptoms, our interference, it must be confessed, proves of very little use. The auspicious circumstances in which the interference of art proves beneficial occur more frequently in scarlatina, than in measles, small-pox, or putrid fever.

I now propose to point out to you the good which the physician can do in scarlatina. It is of the utmost importance that he have always present in his mind the fact, that this disease differs much

from itself both in symptoms and severity: he must always remember that it is sometimes exceedingly mild, and at other times as terribly malignant as typhus or plague: in a word, he must bear in mind the type of the prevailing epidemic. It behoves him not to set down to the account of successful treatment results entirely attributable to the mild character of the epidemic, and equally to avoid throwing the blame of unfortunate issues upon the treatment, when they are really dependent upon the inherent malignity of the cases.

Epidemics of scarlatina may be of a formidable type in respect of an entire population, or in respect of a single family. The malignity may, so to speak, remain confined to one small circumscribed centre, within which nearly all who are attacked will have the disease in a malignant form. As a case in point, I may refer to a melancholy statement lately made public in an English newspaper, to the effect that a clergyman of the city of York lost, by scarlatina, in one week, his six or seven children.

It seems as if the scarlatinous poison with which such unfortunates are infected has a special energy, and that the constitutions of every one of them is specially disposed to receive it. Whether the malignity is dependent upon the nature of the disease itself, upon the constitution of the epidemic, as Sydenham and others allege, or whether upon the idiosyncrasies of individuals, as Stoll believes, there is no uncertainty as to the great fact, that when scarlatina breaks out with fury in a family, killing the first person attacked, there is cause to fear that it will carry off other victims; and that, on the other hand, when its first assault upon a family is moderate, when the first cases are mild, there is reason to hope that all the subsequent cases will likewise be mild. It was necessary to say what I have now said before entering upon the subject of treatment, so that you might be put on your guard against yourselves. I cannot too often repeat that the best treatment will fail when the type of the disease is essentially bad, and that when it is mild, recovery will be the rule, even when inappropriate or injurious measures have been employed.

There is a general agreement among all epidemiologists that injury is done by pursuing such antiphlogistic measures as local or general bleeding, too active purging, and very low diet. Most authors who have seen, studied, and recorded several successive epidemics point out the danger of this kind of treatment in severe

cases of scarlatina, even when acute inflammatory affections have supervened, such as phlegmon of the tonsils, lymphatic glands, or cellular tissue. Bleedings and the application of leeches generally produce a bad effect, probably because they are employed to combat the symptoms of a septic disease, a malady of a bad character—*mali moris*—for antiphlogistic measures almost always prove disastrous in malignant diseases.

Epidemiologists, however, while they condemn antiphlogistic treatment on account of the evil which they have seen it produce, inculcate that although energetic purgatives are injurious, mild purgatives, such as mercurials and the neutral salts, are of real service, when given in moderate doses. My own experience has demonstrated to me the truth of that doctrine. If the alimentary canal is loaded, and signs of faulty chylification exist, it is advantageous to open the bowels by administering a purgative suited to the age and strength of the patient. I cannot participate in Sydenham's dread of diarrhœa, so long as it remains moderate and is dependent upon a loaded condition of the alimentary passage.

I have already said that in scarlatina, particularly in the acute stage, patients are frequently carried off by nervous affections. These affections may have their starting-point in the centres of organic life, in which case they are characterised by an extraordinary elevation in the temperature of the body, by vomiting and intractable diarrhœa; or they may originate in the centres of animal life, when the phenomena are delirium, coma vigil, jerking of the tendons, and convulsions. I have already insisted on the fact that vomiting and intractable diarrhœa at the onset of scarlatina are very unfavorable symptoms, and that it is difficult to control them by medicines. It is in vain that we administer opiates and poisonous solanaceous drugs. The vomiting and diarrhœa are sometimes moderated by the use of tepid baths, and by administering ice, effervescing draughts, and small doses of calomel. They are generally aggravated by bloodletting.

Cold affusions have been proved by experience to produce beneficial effects in these affections dependent on disturbance of the nervous system, particularly on those originating in the centres of animal life; but nevertheless, it is with trembling that the practitioner employs them. Currie was the first to formulate rules for their use. He employed cold affusions with a certain measure of success in a large number of very bad cases of scarlatina. Emboldened by

fortunate results, he became still more urgent in his recommendation of this method of treatment, and laid it down as a general rule of practice that it ought to be adopted in scarlatina when there were formidable nervous symptoms, such as delirium, convulsions, diarrhœa, excessive vomiting, and great heat of skin.

The patient being placed, naked, in an empty bath, has thrown over his body three or four pails of water at a temperature of from 20 to 25 degrees of the centigrade thermometer. The continuance of the affusion is from a quarter of a minute to one minute, which latter is the maximum duration. The patient is immediately afterwards put back to bed, without being dried, but being wrapped up in blankets and properly covered. Reaction is generally established within fifteen or twenty minutes. The affusion is repeated once or twice in twenty-four hours, according to the severity of the symptoms. This treatment ought at once to be resorted to, when the nervous phenomena assume such intensity as to threaten imminent danger, and they ought to be repeated at proper intervals till the symptoms have so far abated as to relieve the physician from serious anxiety.

This practice must be carried out in watchfulness. It is above everything essential not to require the support of public opinion to justify your instituting a method of treatment which has the appearance of being so audacious. You must be actuated by a profound sense of duty to venture to oppose the popular prejudice—a most disastrous prejudice—which insists upon patients with eruptive fevers being kept on hot drinks, and wrapt up in a more abundant supply of blankets than they were accustomed to when in health. I say that there is no popular prejudice more disastrous, for there is none which so often occasions the death of patients. Nevertheless, the mighty voice of Sydenham, who though dead two hundred years still speaks, and the authority of the most mature modern physicians, ceaselessly oppose it without avail. Hence the difficulties which the young physician has to encounter, when he feels that it is his duty to have recourse to cold affusions in scarlatina. These difficulties are all the greater, that it is in cases which threaten to prove fatal that the treatment is indicated. When you adopt it, you know that the disease only presents you with one chance of recovery against two of death: and you can foretell the reflections of the family in the event of your efforts not being crowned with success!

I have long been in the habit of employing cold affusions. I used

them, however, in my private before administering them in my public practice, because I never venture for the first time upon a new mode of practice upon my hospital patients. I declare to you that I have never resorted to the employment of cold affusions without obtaining beneficial results. I am far from pretending that all my patients so treated have recovered: like my colleagues, I have lost the greater number, but even those who died experienced a temporary relief from suffering, and the affusion, so far from proving injurious to them, always moderated the symptoms, and also seemed always to retard the fatal termination. The adoption of this practice subjected my popularity as a practitioner to great risks, and my resorting to it, from a profound conviction that it was right, has often been badly recompensed. But still, I have always firmly continued in the line traced out for me by duty, and now I do not hold to it with less determination, that I am less afraid than formerly of incurring responsibility. I perfectly appreciate your alarms: not because I suppose you doubt the goodness of a mode of treatment which perhaps you would not dare to resort to, but because I imagine that whilst consulting, in the first instance, the interests of your clients, you will naturally desire to protect your professional reputation, so liable to be blasted at the beginning of your career. However, remember that when the voice of duty commands, when your conscience tells you that the cold affusion ought to be administered, you must not flinch from having recourse to this method of treatment because it is opposed to the prejudices of the public. But in place of fighting face to face with prejudice, in place of taking the bull by the horns—pardon me the phrase—evade the difficulty, by adopting such manipulations as will lead the patient, and still more those in attendance, to believe that the affusions are warm and not cold.

I have already repeatedly said that scarlatina, especially when its form is malignant, is of all diseases that in which the temperature of the body rises to the highest point. Very often it rises to forty-one degrees, which is three degrees above the normal standard. Very well, then: in place of giving your patients cold affusions, give them mere lotions of water at twenty-five degrees—that is, of water fifteen degrees under the temperature of the skin in scarlatina, and therefore, relatively to it, cold. Let the patient be placed on a folding-bed:—and then, let the entire body, first the anterior and then the posterior surface, be rapidly wetted with sponges soaked in

this water at twenty-five degrees; and when this has been done, let him be rolled up in blankets and put back into his own bed, following the same rules as after the cold affusion. Though these tepid lotions are less efficacious than the cold affusions, they are productive of real benefit. Consequent upon their employment, the following effects are observed. The skin previously characterised by extreme aridity and stinging heat, in half an hour becomes cooler and moist. The diminution in the rapidity of the pulse is a still more remarkable phenomenon: from between 160 and 180 in children, it falls to 140 or 130; and from 140 or 150 in adults, to 120 or 115:—there being consequently a fall ranging between 30 and 40 beats. Simultaneously with these amelioriations, the severity of the cerebral symptoms diminishes, and there is a proportionate decrease in the profuse diarrhœa and excessive vomiting, symptoms dependent upon disturbance of the ganglionic nervous system. You thus obtain—for a very limited time I admit—a remarkable sedative effect from the tepid bathing. The benefits, I say, are not long continued, for sometimes in two or three hours the symptoms have returned. It is necessary, in point of fact, to renew the lotions or the cold affusions two, three, or four times in the twenty-four hours, and sometimes to continue to employ them for five or six consecutive days.

I saw very lately, along with my excellent friend Dr. Baret, a lad of thirteen suffering from very severe scarlatina. From the third day of the attack, the nervous symptoms assumed so formidable a character that Dr. Baret contemplated the employment of cold lotions: I also believed them to be indispensable. The relations were terrified, but, with that resignation so becoming in intelligent persons who feel their absolute incompetence to judge medical questions, they allowed the proposal to be carried out. Each bathing was followed by considerable amendment; and at the end of four days, when the lad was out of danger, they loudly proclaimed that he owed his life to the cold applications.

Relatives are much reconciled to the use of the cold affusions and cold lotions by the circumstance, that the skin, pale before, almost always becomes much redder after they have been employed—there is more eruption seen. This method of treatment so far from effacing the eruption, increases it. This is so palpable that it is noticed by the relatives of the patient who will, so long as danger lasts, often be the first to solicit the renewed application of cold water, so evi-

dent to them is the amendment which has resulted from the treatment, and so struck are they by the material fact of a brighter red having been imparted to the eruption. It is nevertheless true that if the amendment noticed is not perfected by recovery, if death come, in the inevitable march of events, they too often forget the encouragement they gave to your proceedings.

Some of you, gentlemen, recollect a case which I am now going to relate in detail. On the 10th of May, 1857, a stout, fine girl of twenty came into Professor Rostan's wards with scarlatina in an exceedingly severe form: she had been ill for two days. My honorable colleague had the goodness to show me this patient, and to propose that she should be received into my wards. She had violent delirium and excessive restlessness; her pulse was 144 in the minute; there was great heat of skin, and scarlatinous sore throat of aggravated character. The restlessness and delirium were serious and threatening symptoms. Professor Rostan wished to have my opinion as to the treatment to be adopted: he inclined towards bloodletting; and I proposed cold affusions. The patient was received into my wards. On her admission, I had her put into an empty bath: to accomplish this, it was necessary to have the assistance of four persons, so great was her violence. I then, somewhat slowly, poured over her body two ewers, each containing about two litres of water at a temperature of about 15° centigrade [59° F.]. I at the same time watered the face and limbs: after this treatment, without being dried, she was wrapped up in a blanket and put back in her bed. Her violence was by this time sensibly calmed, the pulse had fallen ten beats, and there was less of a burning character in the heat of skin. I advised my *chef de clinique*, Dr. Blondeau, to see her again towards evening, and repeat the affusion, if, as I hoped, the first application had produced a change for the better. In the evening, the affusion was repeated as in the morning, the patient offering less resistance. Soon after the evening affusion, the heat of skin subsided greatly; and the pulse fell to 120: in the morning, as already stated, the pulse was 144. The delirium ceased; she passed a quiet night; and at the visit next morning, answered my questions intelligently. The disease had resumed its normal course, disentangled from all complications. Although this patient had slight albuminuria for eight days, she left the hospital quite recovered from her attack, and in perfect health, at the beginning of July. Desquamation was not completed till

near the end of June, forty-five days after the onset of the attack of scarlatina.

There are two cardinal points in this case, gentlemen, to which I wish to call your attention: the first embraces the diminution of the febrile heat, the lessening of the rapidity of pulse, the cessation of delirium and restlessness; and the second is the increase of the eruption. The cold affusion, so far from driving in the eruption, brings it out more vividly. The young woman whose case I have just detailed was at the end of the third day of the attack when I saw her, and the eruption, therefore, was at its maximum of intensity: nevertheless, it became more vivid after the application of the cold water. With respect to the diminution in the frequency of the pulse, the lowering of the temperature, and the cessation of delirium—ataxic symptoms which as a rule increase in severity up to the sixth or seventh day of the disease—they did not merely remain stationary, which would have been a relative benefit, but they became more moderate, and ultimately ceased.

A few days later, on the 23rd May, 1857, another opportunity was afforded in my wards for employing the same treatment; but the case was of so complicated a nature that we could not hope for similar success. The patient was a woman of 24 years of age, who ten days previously had given birth to a healthy infant, and four days after her confinement was attacked by scarlatina. There were no symptoms specially dependent on recent delivery—no signs of peritonitis or phlebitis—but the patient was not the less in a puerperal condition when the exanthematous fever declared itself with great violence. When admitted into our wards, she was suffering from great excitement and delirium. The skin was very hot, and covered with a vivid red eruption; the tongue was dry and black; there was considerable oppression at the chest, and the pulse was 136. Without being deterred by her puerperal state, and the lochial discharge which was flowing in a normal manner, my *chef de clinique*, Dr. Blondeau, who saw her in the evening, had her subjected to the cold affusion: I approved of the treatment, which I would myself have ordered. Immediately after the affusion—during which she had a fainting fit—this unfortunate woman felt much better: the delirium subsided as if by enchantment; there was relief from the violent pains, chiefly in the loins, of which she had been complaining; and she expressed herself as grateful for this rapid relief. A few hours later, however, there was a return of the

nervous symptoms. She passed a very bad night, and at my visit next morning, the delirium, excitement, and oppression at the chest were extreme. The pulse which had in the evening, after the affusion, fallen from 136 to 120, had returned to its former frequency. The eruption continued at least as vivid as before the employment of the cold affusion. I administered a second affusion: the delirium ceased at once, and the excitement became less. The patient again experienced a feeling of improvement, similar to that which she had felt after the treatment on the previous evening, and the recollection of that feeling always present to her mind, caused her during her lucid moments to ask for the cold water. Those of you, gentlemen, who were present at the visit can testify to the beneficial effects which resulted from the treatment; the pulse again fell from 136 to 122, but the great oppression at the chest continued, and could not be in any way explained by the state of the thoracic organs, auscultation presenting nothing particular. This symptom gave us serious anxiety as to the issue of the disease which was in so formidable a manner complicating the puerperal condition. I seize this opportunity of telling you how very perilous scarlatina is when associated with the puerperal state: the patients either succumb under aggravated nervous symptoms which leave no lesions appreciable on dissection, or from inflammations of the serous membranes —the pleuræ, pericardium, or peritoneum—passing rapidly into suppuration.

In 1828, Drs. Ramon, Leblanc and I were sent by M. de Martignac, then Minister of the Interior, to study the epidemics and epizootiæ prevalent in old Sologne, that part of France which lies between the rivers Cher and Loire, extending from Blois to Gien. We saw occurring simultaneously with severe cases of scarlatina, numerous cases of membranous sore throat. Scarlatina was particularly severe at Cour-Cheverny, a commune situated four miles south of Blois: and it had proved so specially fatal to puerperal women, that even the very poorest were leaving the place and going to Blois to be confined. The district physician informed us that he had lost nine cases. Now, as you know, puerperal epidemics are very rare in country places. Generally speaking, pregnant women are proof against epidemic influences, but in thirty-six cases, forty-eight hours after delivery, the scarlatinous eruption showed itself, and in a few days the patients were dead.

The puerperal state, therefore, is a very serious complication of

scarlatina. This was seen in our patient in number 19. The disease called puerperal fever was prevailing in Paris. The Maternity Hospital had in consequence been recently closed, and I had cases of this formidable malady in my wards in the Hôtel-Dieu. Newborn infants were carried off by erysipelas of bad type, a manifestation of puerperal fever in young subjects, and which proves fatal to them without leaving any appreciable lesions in internal organs. Our patient you see was in the most unfavorable circumstances. Oppression at the chest, when unconnected with any material affection of the respiratory passages, is an exceedingly serious symptom in a great number of septic diseases, particularly in puerperal fever, typhoid fever, and cholera, indicating a profound disturbance of innervation. This kind of dyspnœa, unconnected with any appreciable lesion of the lungs, pleuræ, heart, pericardium, or great vessels, is one of the most unfavorable symptoms which can occur. The symptoms referable to the nervous system became more formidable, and our patient died during the day.

On opening the body, our attention was chiefly directed to the lungs, heart, and membranous coverings of the encephalon. I was the more desirous to discover whether there was any lesion in these latter organs, as in the girl who was the subject of our first case, the nervous symptoms were referred to the meninges. The autopsy, which was carefully made, revealed nothing. The encephalon, attentively examined, presented no trace of lesion; and in the lungs, there was nothing found except slight congestion, such as we find in persons who have died a violent death. The heart, pericardium, and large vessels were in a perfectly healthy state. The results of the microscopic examination did not surprise me, for I had often examined the bodies of persons carried off under similar circumstances, and had never met with any appreciable alterations in the encephalon, which, however, is not equivalent to saying that it is never the seat of any organic changes. These morbid changes are met with in connection with certain symptoms referable to the nervous system, but essentially different from the symptoms presented by the patient whose organs are now under our consideration, and which organs had no trace in them of the symptoms which had occurred during life.

We, therefore, had to do in this case with the delirium to which our predecessors gave the name of *delirium sine materia*—cerebral disturbance without appreciable lesion of the brain. We all form a

strange conception of the nature of delirium. When it occurs in the course of an acute affection, we at once explain it by invoking cerebral hyperæmia, and our theory, which has in it something of the leaven of the old physiology, is based on a belief in the irritation of the organ of the function which is disordered. Such was the language used in 1820, 1824, and 1825: and at the present day, these ideas exist in a modified form. There is, it appears, therefore, a desire to attribute functional disturbance to a state of congestion leading to inflammation. The simplicity of the theory certainly makes it attractive. A man is delirious, he coughs, he vomits bile: nothing is easier than to say that he has cerebral, pulmonary, or hepatic hyperæmia. But at the autopsy, the aspect of the case is changed, when the examination of organs frequently demonstrates that an erroneous opinion had been formed. The supposed hyperæmia does not in any way reveal its past existence: reasoning, moreover, shows a connection between the phenomena during life and appearances after death appreciable to the senses.

Is not anæmia—the condition exactly the opposite of hyperæmia—accompanied by similar symptoms? Do not the animals whose throats are cut in the slaughter-houses die in convulsions from loss of blood? What are these convulsions, if they be not a sort of delirious action of the muscles? Why may not anæmia produce in the same way a delirious action of the intellect? A woman, in consequence of profuse metrorrhagia, is attacked with great functional disturbance of the cerebro-spinal centres: in such a case, it is clear that hyperæmia cannot be assigned as the cause of the nervous symptoms. In such cases, we have an absolute demonstration of the fact, that anæmia can produce convulsions, coma, and delirium. We have, therefore, no right to assert, as one is too often tempted to do, that these symptoms depend on congestion of the nervous system. There is no doubt evidence to show that they sometimes depend on that state, and on meningitis; but meningitis is far from being a condition essential to their production.

In septic diseases, the conditions are very different, for then we have to do with real cases of poisoning. Whether the blood undergoes a great change under the influence of the toxic principle, or whether it is only the medium by which the poison is carried to the centres of nervous power, there to originate disordered action, still, the same thing which happens in septic diseases also occurs when we administer drugs having an action on the nervous system, such as

belladonna, henbane, mandrake, thorn-apple, and hemlock, substances which cause delirium varying in character according to the individual substance given. The delirium caused by opium is different from that caused by members of the family *solinaceæ*, and they again do not produce the same kind of delirium as is determined by the *umbelliferæ*. The differences in the character of the nervous symptoms resulting from the administration of different drugs are so distinctive, that a physician acquainted with their respective modes of action will, from the form in which the convulsions or delirium show themselves, be able to recognise the particular substance which has produced them. The septic poisons of scarlatina, measles, small-pox, malignant pustule, dothienteritis, or puerperal fever have also their special action on the nervous system. Why, therefore, should we be surprised to see these poison-diseases accompanied by delirium? To explain this, is it necessary to have recourse to hyperæmia, seeing that it is not taken into account in considering cases of poisoning with vegetable substances? In both classes of cases, the symptoms arise independently of hyperæmia; and our inability to discover their cause is no reason why we should be forced to admit the existence of an unknown action which we cannot explain. Moreover, delirium and other nervous symptoms may occur irrespective altogether of any toxic or septic cause: they may be produced by mere tickling, using the word [*vellication*] in the acceptation of the Latin verb *vellicare*.

Cases are mentioned in which persons have caused women to die by tickling the soles of their feet. The unfortunate victims became exhausted and fell into a state of violent delirium, accompanied by extraordinary nervous phenomena. Tickling may by itself, then, produce delirium, or an exaggerated state of innervation caused by forced excitement of the nervous system, similar, for example, to a condition almost physiological, that which exists in the act of copulation. This tickling [*vellication*]—to continue the use of the word—this unnatural excitement of the sensibility, due perhaps to reflex action, is equally liable to occur in the nervous apparatus of organic life, and in that which regulates relative life. It is thus that we can explain certain formidable symptoms in children, such as delirium, convulsions, paralysis, and loss of vision, caused by the presence of intestinal worms, even when the worms occasion no decided pain in the abdominal viscera. In these cases, cerebral hyperæmia plays no part; and even in other cases where the brain is directly

implicated, congestion has no share in the production of the nervous phenomena to which I am now calling your attention. In the insane, in individuals who during many years have had frequent attacks of delirium, we occasionally find on dissection lesions indicative of chronic inflammation having existed, but most frequently we meet with no traces of hyperæmia. Still less will hyperæmia explain that sort of delirium, or transient disturbance of the intellectual powers, to which men of the greatest abilities and best regulated minds are sometimes subject.

Let us now return to the treatment of scarlatina by cold affusions. You must quite understand that I do not employ them indiscriminately in all ordinary cases of the disease, as is the practice of the extreme partisans of the treatment: I only use them to subdue serious nervous complications—formidable ataxic symptoms.

We may also beneficially combat ataxic symptoms by internal remedies. In their first rank stand ammonia, and its preparations carbonate of ammonia and spirit of Mindererus, the latter being a mixture of acetate of ammonia with some empyreumatic products. Both preparations in doses of from two to four grammes, and the solution of ammonia in doses of from ten to twenty drops, may prove very useful. I may say the same of musk, which is prescribed in doses of twenty, thirty and forty centigrammes, and of which as much as a gramme may be given in twenty-four hours. Some prudence is required in the management of these remedies: they constitute an accessory means of treatment in the cases in which we use the cold affusions; and when for any reason the affusions are not employed, ammonia and musk are our principal therapeutic agents.

Scarlatinous sore throat accompanied by fibrinous exudation does not involve absolute danger, unless the exudation is excessive. Under observation of the followers of any clinical practice, I have allowed patients labouring under this affection to remain without treatment; and this abstinence from interference was very conspicuous in the case of a lad who occupied bed No. 17 in St. Agnes's ward. In his case, the fibrinous exudations and the pappy patches on the tonsils disappeared spontaneously within four or five days.

Though this kind of sore throat undergoes spontaneous cure in simple scarlatina, the throat affection is generally intractable in the malignant form of the disease. I have tried cauterization with

nitrate of silver and with hydrochloric acid; I have tried borax washes; I have prescribed chlorate of potash in gargles and potions; and I declare that they have all frequently failed to produce any beneficial results in the sore throat of malignant scarlatina. The least untrustworthy of these therapeutic agents is hydrochloric acid, which when applied twice a day has appeared to have some efficacy. This caustic requires to be employed with prudence and precaution. In children struggling to resist the application, there is a risk of burning the tongue, injuring the teeth, and touching the internal surface of the mouth, thereby almost always aggravating the evil without properly effecting the cauterization. But by holding the child in a convenient position, and separating the jaws by means of a tongue-depressor, it is possible exactly to touch the affected parts with a hair-pencil soaked in the acid. Good results are sometimes obtained by cauterizations effected in this manner twice in twenty-four hours for five or six days.

Insufflation of alum and tannin, practised alternately, are also very useful.

When this bad form of the affection of the throat is met with after the acute stage of the attack, coming on suddenly about the ninth or tenth day with copious discharge from the nose, deafness and acute pain in the ears, horrible fœtor of the breath, great frequency of the pulse, and depression of the vital power, I look upon it as a diphtheritic complication of the eruptive fever. I have found that all means directed against it prove ineffectual. Styptic nasal injections of solutions of sulphate of copper, sulphate of zinc, nitrate of silver, of decoction of rhatany, and of tannin, as well as energetic cauterizations of the throat, have all failed: whatever was done, the patients almost invariably died. In these cases, the general treatment is the most important: we must chiefly rely on diffusible stimulants, sulphate of quinine, infusion of coffee, and especially on a system of tonic alimentation: but it too often happens that these measures prove of no avail.

We must now consider the treatment of scarlatinous anasarca and its complications. As I have already remarked, anasarca occurs perhaps less frequently after severe cases than during, or at the decline of, mild attacks. It is sometimes a very formidable, and at other times, not at all a serious complication. When the anasarca is slight, hygienical measures, rest in bed, tepid drinks, and moderate diet are all that is required; and even in slight anasarca associated

with some hæmaturia, the symptoms may be easily subdued by acid drinks, lemonade, decoction of *uva ursi* sweetened with spirit of turpentine, small doses of fox-glove, and mild laxatives. But when the anasarca increases very rapidly, it is necessary to have recourse to other means for the prevention of the troublesome symptoms which then threaten. As the treatment required in the two forms of the affection is different, you require to keep both present to the mind. When the anasarca is accompanied by a real febrile reaction characterised by heat of skin, quickness of pulse, oppressed breathing, thirst and dry tongue, antiphlogistic treatment is necessary, and you may with great benefit bleed from the arm once or even twice: the relief afforded by the bloodletting is shown by a diminution of the phenomena of reaction. By following up the abstraction of blood by the administration of calomel in minute doses—a specially excellent antiphlogistic measure—you deprive the anasarca of its acute character, while at the same time, by the purgative action of the medicine, you lessen the œdema. This result may now be accelerated by giving diuretics, although before the institution of the antiphlogistic treatment they had been of no use.

Should the œdema be of a cold character, unaccompanied by fever, you must abstain from bloodletting, and promptly administer those purgatives which cause the intestinal mucous membrane to pour forth serosity in such abundance as to bring about the cessation of the anasarca, and you will also, with the same object, stimulate the urinary secretion by diuretics. If the relaxation, the loss of tone in the tissues, should be very great, it will be advantageous to combine the employment of tonics, particularly quinine, with the treatment now recommended, or to give large doses of the iodide of potassium, a remedy much lauded in such cases by Graves.

The acute form of anasarca is often preceded or accompanied by hæmaturia, or at least by the passing of some of the constituents of the blood with the urine. All pathologists are agreed in attributing this passing of blood or of its elements to hyperæmia of the kidneys, often inflammatory in character, as is evident from its attendant febrile reaction. Measures of general depletion, such as I have recommended in the acute form of the anasarca, have a very beneficial influence on this kind of renal congestion. I concur with the unanimous opinion of clinical teachers that diuretics do harm by increasing the renal hyperæmia, and consequently augmenting the quantity of blood passed with the urine. Benefit is often derived

from the use of hæmostatics, such as sulphuric acid or alcoholised sulphuric acid [*eau de Rabel*]—the latter in doses of two, three, or four grammes a day, in a tisane sweetened with syrop of rhatany.

Among the complications of scarlatina, anasarca is that which is most frequently brought on by exposure to cold. It is necessary, therefore, to protect patients as much as possible from this influence, particularly at the epochs of the disease at which, according to statistical data, the swelling is most liable to occur; that is to say, during the second and third week, and, in a very special manner, immediately before the fourteenth and twenty-first day. The precautions to be taken will be more or less rigorous according to the season of the year.

There is no similarity, but on the contrary curious differences between small-pox, measles, and scarlatina, in their relation to the injurious influence of cold. Sydenham thought that small-pox patients ought to get up every day, even when the eruption was at its height: and nothing happened to show that patients treated in this way were disposed at any period of the malady to contract intercurrent affections through chills. Patients suffering from measles are neither so little affected by exposure to cold as variolous patients, nor so susceptible to it as scarlatinous patients. Upon some persons suffering from measles, cold seems to produce no impression, whilst it increases in others the bronchitis, the inseparable companion of the eruption: this affection may extend to the minutest bronchial ramifications, and to the pulmonary tissue, giving rise to capillary bronchitis or a special form of pneumonia, the two most serious complications of measles. The pulmonary complication sometimes supervenes during a slight attack of anasarca. The susceptibility to cold is at its maximum in scarlatinous patients. Hence it is necessary to take the greatest possible precautions to protect the patients from exposure to chills. But in saying this, I do not mean to imply, that it is ever right, at any stage of the disease, to shut up the patient in a suffocating atmosphere, to load him with blankets, and excite him with hot drinks. A moderate temperature, no more blankets than he is accustomed to in health, and the use of tepid beverages, acidulated and slightly cooling, are the most appropriate measures. It is necessary, however, to confine scarlatinous convalescents to their rooms for a long time, to save them from the risk of exposure to sudden transitions of temperature, currents of cold air, and damp; for from such causes

arise anasarca, hæmaturia, effusion into the pleuræ and pericardium, or still worse into the ventricles of the brain.

Extensive anasarca, coming on rapidly, is often accompanied by convulsions which sometimes prove fatal in their first attack. Brisk purgatives are useful in these cases by stimulating the intestine to discharge a part of the serosity effused into the cellular tissue. The patient should be placed on the edge of the bed with the legs hanging over it, and ought to have the head propped up by pillows. By these means an impending attack of convulsions may be warded off. But sometimes, from the convulsions occurring without the slightest premonitory signs, no preventive means can be attempted. The patient complains of intense headache, imperfect vision in one or both eyes, ringing in the ears, and very obvious deafness. In these cases scarifications of the inferior extremities may be useful, by producing disengorgement. This object, however, is more successfully attained by applying very large blisters to the legs—not to the thighs. In seven or eight hours, phlyctænæ are formed: by opening them, an exit is afforded to a stream of serosity, by which discharge the patient is wonderfully relieved, and enabled to tide over the most perilous crisis of his anasarca.

When convulsions occur during the disease, give musk in combination with small doses of belladonna. To children between eight and ten years of age, give the musk in doses of from twenty-five to forty centigrammes, and the belladonna in doses not exceeding one centigramme, in the form of a draught. At the same time that you employ these medicines, you ought also to practise *compression of the carotids*, a means which I have extolled for twenty years, and which has rendered very great services to me and other physicians. The compression requires to be performed with care and according to rule. If one side is more affected than the other by epileptiform convulsion, it is on the opposite side that the compression ought to be most specially applied. If the convulsion predominates on the right side, you compress the left carotid; and if it predominate on the left side, you compress the right carotid. If both sides are equally convulsed, you compress each carotid alternately. Of course I am speaking of the common carotids. The compression must be effected in such a way as to interfere as little as possible with the respiration of the child. The compression of these vessels is much easier than you might suppose. You place yourself in such a position as will enable you to compress the right

carotid with the left hand, and the left carotid with the right hand. You keep apart the bellies of the sterno-cleido-mastoid muscle; and then, at the same time that you isolate the wind-pipe, using the back of the distal phalanx, you feel the pulsations of the artery, which is very mobile. You then seize the artery with the cushioned extremities of the fingers, push it a little backwards, and press it against the vertebral column. You immediately find that the vessel is compressed, by observing that there is an absence of pulsation in the corresponding temporal artery, and perhaps also by seeing a sudden paleness take the place of the previous red colour of the child's face. Sometimes, also, you have the satisfaction to find that no sooner is the compression established than the eclampsia entirely ceases. You maintain the pressure for fifteen to twenty minutes, first on one artery and then on the other. It is useful to have the co-operation of an assistant in this irksome operation. Mothers, who through affectionate anxiety for their children become so intelligent, may take your place for a time. You may thus, by exercising the necessary patience, in a few hours, in a certain number of cases, put a stop to the convulsions which accompany scarlatinous anasarca.

Serous effusion into the pleuræ and pericardium, formidable complications which occur in the last stage of scarlatina, about the same period as anasarca, ought to be treated by a succession of large flying blisters. If the hydrothorax or pericardiac effusion be considerable, tapping will be useful. When the pleural effusion is very great, paracentesis is sometimes a necessity after a few days. But it often happens, as I have already observed to you, that at the first tapping, even when the effusion is not of older date than ten, fifteen, or twenty days, you may find the serosity lactescent, and even containing formed pus: you have then to do with veritable empyema, a formidable complication which is often curable in young subjects by tapping and frequent iodinous injections; but which, notwithstanding the use of these means, rarely terminates favourably in adults.

LECTURE VI.

MEASLES; AND IN PARTICULAR ITS UNFAVOURABLE SYMPTOMS AND COMPLICATIONS.

Normal Measles.—Period of Invasion is longer than in any other Eruptive Fever.—Complications of the Period of Invasion.—Convulsions at the Beginning of the Attack.—False Croup.—Suffocative Catarrh.—Epistaxis.—Otitis.—Diarrhœa.—Complications of the Eruptive Stage, and of the Last Stage.

Gentlemen:—In speaking of measles, I shall not go into the subject with that circumstantial detail with which I have treated scarlatina. There is no eruptive disease which assumes such strange forms, and furnishes materials for so much pathological discussion as scarlatina: measles has not the same claims on our attention. I shall, therefore, only trace rapidly the symptoms of measles in its normal form, and specially enlarge upon the unfavourable symptoms and complications which may accompany or follow an attack of that disease. These unfavourable symptoms and complications are unfortunately too little known to young physicians, as I have often had occasion to point out to you. You are aware, gentlemen, that it is not for me in a course of clinical lectures to give you a complete history of measles: that duty belongs to the professor of medical pathology. But I wish to make you acquainted with the complications of this exanthematous pyrexia, explaining to you their mode of evolution by analysing and discussing cases selected for that purpose in the wards. I must, however, in a summary manner, recall to your recollection the ordinary phenomena of the different stages of measles, which, when they become exaggerated, constitute what we call the complications.

From the very beginning of the attack, in the simplest forms of the disease, symptoms present themselves in the mucous membranes of the eye and respiratory passages, which are perfectly well known

to those who have once observed them. They consist in lachrymation, injection of the eyes, and slight intoleranee of light; in coryza, characterised by a flow of acrid tenacious mucus, frequent sneezing, and often accompanied by profuse epistaxis; and in a severe cough, at times a little hoarse, and at other times very violent and very harassing. The mucous membranes of the eyes, nose, larynx, and bronchial tubes are affected, therefore, from the earliest days of an attack of measles. From the very first day, as in scarlatina, they show the presence of the eruption; and before there is any exanthem on the skin, you see the disease inscribed on the pharynx, tonsils, and veil of the palate.

In this stage—the stage of invasion—the fever has not the same character as in small-pox, in which disease, from the very outset of the first febrile symptoms up to the appearance of the eruption, the fever is continuous, always lasting at least till the day on which the pustules come out. In measles, the febrile symptoms follow an entirely different course, which sometimes singularly misleads physicians. Sometimes the fever continues up to the period of eruption: at other times, it only lasts one or two days, abating very much and sometimes ceasing entirely on the third day, leaving the patient, whether adult or child, with only a slight feeling of discomfort; it reappears, however, with great intensity on the day the eruption comes out. It begins with slight rigors, recurring from three to six times in the twenty-four hours, which, as they are followed by hot fits and sweating, simulate the paroxysms of the remittent and intermittent fevers, which have a tendency to become continued, and are rather common in the beginning of attacks of dothienteritis. In the absence of lachrymation, coryza, epistaxis, and cough, one is very often embarrassed as to the diagnosis, and does not recognise the existence of measles at the beginning of the attack, unless guided by other circumstances than those which belong to the disease itself, such as some of the family having measles, or its being at the time prevalent as an epidemic. The duration of the period of invasion is, therefore, a material circumstance in relation to the diagnosis.

The period of invasion is longer in measles than in any other eruptive fever. In scarlatina on the other hand, it is shorter than in any other eruptive fever, its duration sometimes not exceeding a few hours or a few minutes. Next comes confluent small-pox, the invasion-stage of which continues three days, the pustules appearing

very regularly at the end of the third or beginning of the fourth day. The cutaneous exanthem of measles does not appear till the fourth or fifth day, and sometimes, even in perfectly uncomplicated cases, not till the sixth, seventh, or eighth day. We have just had an example of this in the workman of twenty-eight years of age who occupied bed No. 18, St. Agnes's ward. In his case I completely mistook the nature of the disease, as the eruption of measles did not appear till the seventh day: notwithstanding the delay in the eruption, the case was free from any complication. In rare and exceptional cases of scarlatina and small-pox, when serious complications supervene at the beginning of the attack, the appearance of the eruption is retarded: in measles the general rule is that the duration of the period of invasion is four or five days irrespective of all complications.

During the period of invasion, at the very time when the fever seems to be subsiding, it suddenly acquires a considerable renewal of its intensity. The lachrymation, coryza, and cough, after having been for a very brief space of time in abeyance, return with extreme severity; and simultaneously with this exacerbation of symptoms, very profuse diarrhœa supervenes in the majority of cases. This phenomenon—the simultaneous advent of eruption and diarrhœa—belongs essentially to measles, a fact which has not been sufficiently pointed out by authors. The occurrence, though not invariable, is common enough to demand special notice. A child will have from four to fifteen stools in the twenty-four hours. In some cases the diarrhœa is not only serous, but likewise glairy and bloody, caused by an inflammatory affection of the colon which continues for a day or two. If the diarrhœa continue for more than twenty-four hours, it may, in very young children, become a source of danger, and ought, therefore, to be checked as quickly as possible.

The eruption first appears on the face, next day (the fifth or sixth of the attack) it invades the trunk, and on the following day the limbs, after which it is general. I perceive, gentlemen, that I am causing you to take up an erroneous impression. I already hear some of you reminding me that I have several times shown you in our nursery wards infants in whom at the second day of the fever of measles small efflorescences were visible, in situations where the skin was hot and covered with perspiration. On the next day, or the day after the next, there was scarcely a trace of these efflorescences to be found: and on the regular day of the eruption becoming

due, it appeared with its precise characters well marked. I must here repeat what I have already said to you beside the cradles of our little patients, regarding the limits of the law of evolution in the exanthem of measles. But in many cases analogous to those which I have just brought before you, the efflorescences mentioned were nothing more than sudorific exanthemata, an eruption not to be confounded with the specific exanthem of measles.

So long as the eruption of measles remains bright and blooming [*vive et fleurie*] the fever continues very intense. This is also the case in scarlatina; but the opposite is the rule in distinct small-pox, in which the fever at once subsides when the pustules appear, to be rekindled, however, on the eighth day of the disease, the commencement of the period of maturation. In measles, then, the fever goes on for two or three days after the appearance of the eruption: it then subsides because the eruption subsides: should it not then subside, there is reason to fear the occurrence of complications.

To increased lachrymation, coryza, and cough, there are generally added a little deafness, sometimes acute pain in the ears, in consequence of the Eustachian tubes being affected like the other passages lined by mucous membrane.

The eruption in its simplest form, particularly when examined on the chest and abdomen rather than on the face, presents a crop of small, red, velvety elevations, having neither the roughness to the touch nor the wrinkled aspect so often met with in the eruption of scarlatina. They have a certain similarity to the elevations of urticaria: both the dermis and epidermis are raised up, and the elevations are even more appreciable by touch than sight. The elevations are generally of unequal shape, and somewhat variable in size, being about as large as a grain of rice or corn, and so placed as to circumscribe portions of skin free from the eruption. The elevations are at first separate and disappear under pressure made by the finger, to reappear when that pressure is removed: they afterwards become grouped together in irregular patches unequally cut up into little crescents.

When the eruption is very confluent, the redness is diffuse and uniform, sometimes rendering the diagnosis difficult. Occasionally, particularly in summer, when patients have been too much clothed and perspire profusely, vesicles appear: they are acuminated, generally contain a puriform fluid, have an inflamed base; and they are

much larger than the vesicles which are noted as occurring in scarlatina: in measles a vesicular eruption is exceptional, but in scarlatina it is the rule.

The morbillous patches are sometimes so elevated above the cutaneous surface as to have almost a papular character. When this character predominates in the eruption, the case is said to be one of pimply measles [*rougeole boutonneuse*].

It frequently happens that when the eruption has been very violent, patches of a violet-red colour are seen, particularly on the extremities: they are evidently ecchymotic, for they do not disappear under the pressure of the finger like the exanthematic patches. These spots of purpura remain for seven, eight, or ten days after the disappearance of the morbillous eruption, leaving behind them greenish-yellow stains. This form of measles is more severe than the other, inasmuch as the eruption is more violent; because it is a general rule in eruptive fevers—in small-pox, scarlatina, and measles—that the gravity of the attack is proportionate to the intensity of the eruption. It is most frequently met with during the predominance of certain medical constitutions of the atmosphere, and it may then become one of the most seriously complicated kinds of measles.

Generally speaking, during the periods of invasion and eruption, on auscultating the chest, we hear sibilant râles, which on the day of eruption very often become sub-crepitant, and which, sometimes general throughout the whole extent of both lungs, are accompanied by a degree of oppression in breathing: we have sub-crepitant râles, which indicate that the morbillous catarrh already occupies the minute bronchial tubes. This catarrh may be serious from the first, and may go on increasing in severity up to the eighth or ninth day of the disease, then culminating in an affection of intense severity. The sub-crepitant râles usually heard at the time the eruption is coming out need occasion no alarm, even though they are very fine, provided the other symptoms are not serious: as in general they either disappear or diminish about the seventh or eighth day, when coarse mucous râles are again heard, then sibilant râles, and finally the sounds become normal.

Morbillous catarrh gives rise to a characteristic expectoration. I speak of what is seen in adults and in children of the third age. As you know, infants at the breast, and children under four or five years of age, do not expectorate. The sputa, at first mucous, clear,

and limpid, becomes thick, globular, greenish yellow, perfectly isolated from one another, swimming in more or less glairy slightly opalescent mucus: they are nummular, as in some phthisical cases.

On the eighth day, the erruption begins to disappear: it leaves the face and fades on the trunk. On the ninth day, it has completely left the limbs. The symptoms which then remain are slight ophthalmia, coryza, deafness, and cough, which go on gradually decreasing for seven or eight days, when they totally cease.

The period of desquamation now commences. Classical authorities speak of a furfuraceous desquamation consisting of an epidermic dust resembling small scales of bran; but if you minutely examine what is taking place, you will find that there is not one in ten patients who exhibit a trace of this sort of desquamation. However, when the skin is covered with perspiration—and perspiration is not uncommon in measles—the epidermic scales adhere to the linen, because the exfoliation is exceedingly thin. The desquamation is best seen on the face, because the face, where there is less perspiration than on other parts of the body, is not covered. But even there, the desquamation is often imperceptible: when it is apparent on the face, it is at the eighth day, just as the eruption is beginning to fade, and then you may see the little exfoliations of which I have been speaking.

A diagram of the actual range of temperature in a case of measles, exactly corresponds with what one would suppose, from clinical observation, to be correct; and it graphically represents to the eye the course of the fever. In the prodromic period, during from one to four days, the temperature gradually rises, and does not attain its maximum elevation till the eruption has reached its maximum development. I have already said that the defervescence and the fading of the eruption are coincident: I now add, that when we look at the diagram of the range of temperature, we see that the defervescence is so rapid, so sudden, that in one night the natural temperature of the body is established. In severe cases, the defervescence is not quite so abrupt, though still very rapid, and during the subsidence of the fever, slight exacerbations occur from twenty-four to forty-eight hours. You see, therefore, that defervescence in measles is not lagging as in scarlatina: the very opposite is its character. So essentially characteristic of measles is this rapid defervescence, that it may be concluded that the case is anomalous, and that complications are going to arise, whenever the temperature

remains high after the eruption has begun to fade. The highest temperature observed has been 42°·8. In the researches of Dr. Hugo Siegel, the most common range was between 39°·4 and 40°·6.

I have now, gentlemen, briefly described the course of normal, simple, regular measles. Having given this rapid sketch, we are now better enabled to study the unfavourable symptoms and complications, because they are related to the normal phenomena of the disease.

In children, the principal complications are convulsions and false croup; both in children and in adults, catarrh and epistaxis. During the period of invasion, children are frequently carried off by convulsions and catarrh.

On the first day, at the very onset of the fever, convulsions often attack children having a tendency to nervous affections. Such subjects are liable to be seized with convulsions when fever is setting in, whether that fever be dependent upon measles, small-pox, scarlatina, an intestinal affection, or a simple pulmonary catarrh, just at the moment of the first rigor announcing the febrile condition. I say *just at the moment of the rigor;* and I will tell you why I say so. If you reflect on the nature of a rigor, you will perceive that it is really a convulsion. Study it isolated in a particular part of the body—for example, in the lower jaw. The rigor shows itself by the chattering of the teeth, caused by alternate contraction and relaxation—more or less rapid—of the muscles which raise the lower jaw; the muscular contractions are involuntary and violent. This, as you know, is precisely the definition of a convulsion. When the shivering is general, it is accompanied by headache, violent pains along the vertebral column, and shaking of the whole body produced by the violent and convulsive jerks of the muscles. We have, in fact, real fits of continuous eclampsia, less the cerebral phenomena. How easy then is the transition from a rigor to a fit of convulsions! This consideration will lead you to understand why it is generally at the very first rigor of a fever, when the nervous system is in a specially excited state, that convulsions occur. When once the stir-up is given to the nervous system, the first attack is followed by a second, and by succeeding fits, which recur under the influence of any moral or physical excitement, or in consequence of a somewhat decided external impression, such as is felt on awaking from sleep, when the nervous system emerges from the state of repose in which it had been wrapped.

Convulsions at the beginning of an attack of measles, unless they recur frequently, are not of very serious import. During the period of invasion, two or three fits are not in themselves alarming; but if they go on continuously for one or two days, the child may be carried off in one of them. Unfortunately, medical intervention has a large share in the misfortunes which follow in the train of eclampsia. Nothing alarms a family so much as convulsions; and nothing, I confess, is more frightful. Medical men are sent for in every direction: the practitioner arriving at the end of the crisis and observing only the apoplectic phenomena, loses, sometimes, self-possession, and in the flurry of the moment is liable to make many mistakes. He begins by applying four, six, or eight leeches behind the ear: he sees in the case cerebral congestion, which seems urgently to demand abstraction of blood, with a view to diminish the vascular engorgement. If the patient is a child under four years of age, this treatment will render him anæmic, and so place him in the very condition most apt to produce the evil from which it was intended to save him. Perhaps he orders cold baths, and prescribes cold water to be affused over the head and shoulders of the child when in the bath. The baths and affusions are repeated two or three times during the course of the day. Nevertheless, at this very time, the patient, perhaps, had coryza and pulmonary catarrh. A cold affusion, if accomplished in a few seconds, might do no harm under such circumstances; but that cannot be said of prolonged immersion, and far less of the application of ice to the head, which is often prescribed in such cases. The morbillous catarrh, always in itself an affection sufficiently severe to make us endeavour to moderate it, cannot but increase under the influence of such measures. There is, unfortunately, no exaggeration in what I have now said. How many physicians who though doubtful of the utility of the means they order, yield to the demands by the relatives of the patient for active treatment—for something energetic—for a great demonstration—in cases where the disease itself is terrible and rapid. The treatment by leeches and baths, though a murderous treatment, is so entirely in accord with the theories and prejudices of the public—always ready to dogmatise in medical matters—that were it not for the grave objections to its employment, it would often be difficult to abstain from having recourse to it. The danger is increased by the ignorance of some, and the want of energy of other practitioners.

In other cases, persons who, though physicians, are strangers to our art act in a way still more disastrous. They pour boiling water upon, and surround with cloths soaked in boiling water, the legs of unfortunate children, and so determine in them the occurrence of evils worse than those which they seek to avert. Who has not heard of the frightful accidents, the horrible scalds caused by the medical application of water or some other boiling fluid, which annually result in the death of many children? Who among us has not had occasion to see or to hear related such cases? But how oblivious of them are many practitioners when called in to children in convulsions—how they hasten to have recourse to that brutal treatment which I now so emphatically condemn! The contact of towels soaked in boiling water with the skin is much more prolonged than the contact which takes place in accidental scalding. In an accidental scald, the subject is conscious: at the first sensation of pain he proceeds to tear off his clothes, and to beseech others to help him in doing so. But in the coma consecutive to convulsions, the patient feels nothing; and by allowing the scalding cloths to remain so long in contact with the skin those who ought to afford succour kill, when they believe they are saving. When patients sacrificed by this treatment do not succumb under the influence of pain, they are either carried off by the violence of the inflammation, or they sink exhausted by the suppuration. Those who recover, have cicatrices of greater or less depth, which may—according to their situation—give rise to very great deformities. I have several times seen untoward occurrences of this description. Among other examples, I saw one in the person of a man who was at one time my master, and who stood in a similar relation to some of you. Marjolin, in the course of an attack of typhoid fever, fell into a profound coma, to rouse him from which, boiling water was applied to his thighs. He retained to the last the deep scars which resulted from this medication, and which singularly complicated his malady, and long retarded his convalescence.

When a child is seized with convulsions at the onset of measles, have the wisdom to wait: abstain from boisterous practice: inquire whether the patient is subject to eclampsia, and whether the fits pass off without the interference of art. If your inquiries are answered in the affirmative, very little treatment will be necessary; for in general, the initiatory convulsions of eruptive fevers subside spon-

taneously, without our requiring to interfere. Abstraction of blood, prolonged baths, scaldings with boiling water, blisters (which act in a manner analogous to scaldings), and active purging, far from being useful, aggravate the disease: they trammel its progress, retard the period of eruption, and originate complications which are often fatal.

There are exceptional cases, in which a first fit of convulsions at the beginning of an eruptive fever is fatal. I have often related the particulars of a case which occurred under my own observation in the Necker Hospital. A child of two years of age, who presented no symptoms of cerebral affection, was seized with convulsions, when I was in the very act of examining him. I stated to the pupils then present at the visit, the probable course of the symptoms: I spoke to them of the tonic, which preceding the clonic form would last fifty or sixty seconds, involving the muscles of the extremities, chest, and abdomen, and keeping them in a rigid state as at the commencement of an attack of epilepsy. But on two minutes having elapsed without the rigidity giving way, I began to be alarmed: ere half a minute more had passed, we observed the face become suddenly blue, and the blue colour gradually got deeper; when, all at once, the muscles became relaxed. The child was dead.

However exceptional this and similar cases may be, you may meet with cases of the same kind in your practice. It is essential, therefore, to be able to foresee the chances of bad luck, and to make reservations in announcing your prognosis. I am now speaking only of convulsions at the beginning of measles and small-pox; for convulsions at the onset of scarlatina are not exceptionally but always very unpropitious.

You have, gentlemen, very recently seen in our nursery wards, two children, one of whom recovered, after having had all the symptoms of croup, but of false croup, at the beginning of an attack of measles; and the other died of croup, but of true croup, during convalescence from the exanthematous disease.

I cannot tell you how often families are dismayed at the explosion of these unfavourable symptoms during the first four or five days of an attack of measles in which no eruption has yet appeared. The child, after having in the first instance shown nothing more than the symptoms of a slight catarrh, is suddenly seized with alarming oppression of the chest accompanied by a hoarse cough, wheezing

inspiration, very laborious respiration, and fever. If there are no cases of measles among those with whom the patient is living, the diagnosis is very embarrassing, and one is apt to believe that the malady is that form of acute laryngitis known by the name of pseudo-croup. This error will be immaterial, unless the practitioner interferes, as sometimes happens, in a deplorably hurtful manner. The mistake will not prove injurious, provided he act under the correct conviction that pseudo-croup is seldom a serious affection, and that after some agonising moments, more terrible perhaps to the heart of the mother than hazardous to the life of the child, the unfavourable symptoms subside.

I shall afterwards have to return to the differential diagnosis of acute laryngitis and croup. I presume, however, that it is a subject with which you are familiar. But when you have diagnosed pseudo-croup, take care that you do not allow yourselves to be worked upon by the anxieties of a dismayed family, take care that you do not yield to their very natural impatience; take special care that you do not commit the too common blunder of applying leeches to the neck or the base of the chest. In itself, and in the treatment of false croup, this proceeding is not necessarily dangerous; but if the loss of blood should be great—as it may be—it may involve danger. You very often cannot tell in a child when the bleeding will stop; and excessive bleeding will produce anæmia, which will interfere with the natural course of the disease, of which the laryngitis was only the precursor. Besides, though the treatment may not in itself be dangerous, it is useless, and for that reason ought not to be employed. Graves, who was not well acquainted with diphtheritic affections, having seen but few cases, pointed out a method of treating false croup, similar to that which I recommended to you: it consists in gently pressing a sponge soaked in warm water—very warm, but not hot enough to scald—under the chin, and on the front of the neck. This operation is repeated in ten or fifteen minutes: it produces a sort of determination to the skin, under the influence of which the symptoms subside in a remarkable manner, the cough at the same time losing its hoarseness. In addition to great efficacy, this medication has the recommendation of extreme simplicity: by it unaided we can generally remove symptoms, for which without it we should have to administer emetics. My remark only applies to the laryngeal symptoms; for when they disappear, there still remains the bronchial catarrh, the constant companion of morbillous

fever, and which, in the progress of the case, may become a threatening feature.

Suffocative catarrh is often a serious complication of measles, both in adults and children. About three or four days prior to the development of the eruption, the fever becomes exceedingly violent, oppression of the chest supervenes, accompanied by a moist cough, which, in children, succeeds the hoarse cough of laryngismus stridulus; and auscultation informs us of the existence of sub-crepitant râles throughout the whole extent of the lungs. When these symptoms occur at the second or third day of the period of invasion, they generally imply danger; but the sub-crepitant râle, if unaccompanied by oppression of breathing, is not so alarming.

Capillary catarrh, unconnected with any specific cause, is a very serious malady, particularly in children. It is much more dangerous than lobular pneumonia or pleurisy. There is nothing to cause surprise in the statement, that when it is under the dominion of a specific poison, such as the morbillous poison, it is a still more formidable affection. The skin is either almost or altogether free from eruption; for the whole force of the disease is directed to the bronchial apparatus. Under such circumstances, patients, especially children, sink in three or four days, without any cutaneous eruption having appeared. The malady might, therefore, be mistaken for simple catarrh, though really morbillous catarrh. It is often absolutely impossible to establish a differential diagnosis between the two affections, unless we have some characteristic symptoms to guide us, such as epistaxis, coryza, otitis, or lachrymation; and this difficulty is enhanced when we do not know whether there are any cases of measles in the patient's family or neighbourhood.

In the adult, the form which this catarrh takes is pretty nearly the same as in children. The oppression of breathing is quite as great; on the first or second day, the expectoration assumes a peculiar character: at first it is thin limpid mucus, but about the third day it presents a puriform aspect, the patient expectorating mouthfuls of mucus exactly like pus from an abscess. The sputa are not nummular, and floating in a slightly opalescent serosity like the sputa of normal measles on the seventh, eighth, ninth, and tenth days of the disease, often unnecessarily frighten both patients and their physicians; but they are muco-purulent, like the sputa accompanying the suffocative catarrh of the aged.

Although the suffocative catarrh of measles is a somewhat less

dangerous affection in adults than in children, it must still be looked upon in adults as exceedingly dangerous, and as resisting the most energetic treatment. It generally proves fatal in a few days; but sometimes the patients go on for a week or more, in which case the capillary bronchitis becomes peri-pneumonia, pseudo-lobular pneumonia, or lobular pneumonia. The latter may be either complicated or not complicated with pleurisy, and when uncomplicated in this way, it is much less dangerous.

Emetics, with ipecacuanha at the head of the list, antimonials, the precipitated sulphuret of antimony, and a succession of large blisters to the chest, are the therapeutic means to employ in this fatal form of catarrh, and in the forms of pneumonia by which it is followed. Too often they are powerless.

Urtication is another means of treatment which may produce immediate benefit in certain cases. When the eruption has not appeared on the fourth day, and catarrhal symptoms are present, I order the body of the patient to be scourged with nettles twice or thrice in the twenty-four hours, so as to produce an abundant eruption on the skin. This urtication is less painful than might be supposed, and produces an immediate effect. Although the fever does not subside, the oppression of breathing diminishes gradually as the determination to the skin augments. It is a curious fact that on the second day of this treatment, the nettle-rash, even when the small nettle *urtica urens* (more active than the large nettle *urtica dioica*) has been used, is notably less, and at last, after three or four days, the application produces no effect. This arises from the system having become habituated to the poison, and not from the vitality being so impaired that the organism is no longer acted upon by it. We see precisely the same tolerance of this poison exhibited by country girls who take hold of, and carry in their naked arms with impunity, the very same nettles which at first stung them smartly. Urtication then is of some use in children, and still more in adults, in the treatment of morbillous catarrh. The difference in the degree of efficacy probably depends upon the affection being more severe in the former than in the latter.

There are other, though less important complications of the onset of muscles. I refer to epistaxis and otitis: the latter is often misunderstood.

Epistaxis is an ordinary phenomenon of measles, and when moderate, is certainly not a serious symptom; but it is sometimes so

profuse as to endanger the child's life, or permanently injure his future health. It is treated by applying to the forehead, and causing to be drawn up into the nose, ice and iced water. These measures are good. Astringents, also, prove successful. But the most successful practice is to inject into the nostrils water as hot as the patient can bear. The injections of strong solutions of sulphate of copper and sulphate of zinc, a decoction of rhatany, and a solution of perchloride of iron are excellent hæmostatics. The perchloride of iron, however, has the inconvenience of causing the formation of a large coagulum which occasions pain: two or three days later, on removing it, to relieve the patient from discomfort, a renewal of the hæmorrhage is apt to be produced. But when other means have failed, and the case is urgent, I never hesitate to use perchloride of iron. Sometimes, it is also necessary to have recourse to plugging.

The diagnosis of otitis is generally simple in the adult, who can explain what he feels; but it is not so in the child incapable of describing his sensations, and only making known his sufferings by cries, leaving us to find out the cause and seat of pain. The excessive pain produces delirium, which is often of a very violent character, and the fever increases. To those not previously instructed on the subject, the formidable array of symptoms will appear inexplicable. When a child is beyond the age of dentition, or when, though not beyond it, has no determination of blood to the mouth; when on careful examination we can find no hernia, no distension of the abdomen, no badly fixed pin pricking, nothing in a word to explain the constant and piteous cries, we may conclude that there is otitis. Almost invariably, in thirty-six or forty-eight hours, this conclusion will be confirmed by suppuration showing itself in a discharge from the ear. It is important to bear in mind these facts, so that you may avoid erroneous therapeutical measures and adopt a useful plan of treatment. You may, therefore, rest satisfied with injecting into the external auditory passage some soothing balsam, or a little belladonna dissolved in water or oil, in place of pursuing a too energetic practice to the detriment of the patient. Belladonna and henbane suffice to calm the pain; but unfortunately, they are inadequate to prevent the serious evils which otitis brings in its train, and of which I will speak when considering the complications of the third period.[1]

[1] See page 231.

In enumerating the symptoms which accompany the eruption, I stated that it was generally along with it that diarrhœa appeared. It is rarely a serious symptom: and in simple cases, it even seems to constitute a favourable crisis, when it comes simultaneously with the exanthem on the skin. It would seem that at the moment when the morbid ferment has attained its maximum activity, at the moment when the *despumation* (to use Sydenham's expression) is going to declare itself with all its energy, there cannot be too many emunctories open. The diarrhœal catarrh, particularly in children, seems an advantageous addition to the coryza, ocular catarrh, and bronchial catarrh. In adults, diarrhœa is an unusual occurrence on the day of eruption. As I have already said, this diarrhœa is sometimes very profuse, the patients having ten or even fifteen stools in twenty-four hours. There is, however, no cause for alarm at such an occurrence, provided the eruption, the fever, and the other symptoms are following the regular course; but if the intestinal flux is exceedingly profuse, and continues beyond its natural period, and if at the same time the eruption does not come out well, and the eyes have a sunken appearance, there is danger. We must then lose no time in interfering, because in young children so circumstanced, there is a risk of the case becoming choleriform. Even if the diarrhœa, lasting more than twenty-four hours, is as violent on the second as on the first day, it becomes necessary to interfere. The heroic remedy in such cases is opium. It arrests the intestinal flux; and in virtue of its diaphoretic powers, favours the development of the exanthem, by acting on the skin.

I cannot too earnestly impress upon you the necessity of caution in administering opium to children. They are so exceedingly sensitive to its action that an infant of one year, or under that age, may be stupefied, and remain in a drowsy state for two days, from taking a single drop of laudanum, that is to say, the thirtieth of a grain of opium. For so young a patient with the diarrhœa now under consideration, I prescribe half a drop of the laudanum of Sydenham to be given in divided doses, in lime water, during twenty hours. To prepare the potion, you add one drop of laudanum to two teaspoonfuls of an infusion of coffee: having thrown away one half of this mixture of laudanum and coffee, you add to the half which remains, sixty drachms of lime water. This potion ought to be administered in spoonful doses during the twenty-four hours.

It often happens that the morbillous catarrh of the intestines exhausts itself by attacking the large intestine, producing that special form of colitis characterised by tenesmus and glairy, bloody stools. Let me remark in passing that the term *dysentery* applied to this form of colitis is very inappropriate. Dysentery is an epidemic disease—specific, contagious, independent, and special in its character. If it is colitis, it is colitis of an altogether special nature, and quite different from the colitis of measles—as different as the morbillous is from the scarlatinous exanthem, though both eruptions are cutaneous—as different as eczema is from small-pox, though the pustules of both greatly resemble each other. It is very necessary to establish the distinction between morbillous colitis and dysentery, for the former is much less dangerous than the latter. Morbillous colitis generally terminates in spontaneous recovery. When it goes on too long, it can be stopped by administering albuminous injections; or, if a more rapid result be desired, employ an injection of 100 grammes of distilled water containing in solution from 5 to 10 centigrammes of nitrate of silver, or an injection formed by dissolving in the same quantity of water from 25 to 30 centigrammes of sulphate of copper or sulphate of zinc. By such means you will be able to stop the diarrhœal colic, which comes on at the fifth or sixth day of measles, and is seldom a more serious symptom than the irritation, often rather violent, which affects the upper lip under the influence of the coryza. Between these two symptoms there is a great analogy: they only differ in respect of their seat.

Having now passed in review the different complications of the period of invasion in measles—convulsions, false croup, suffocative catarrh, epistaxis, otitis, and diarrhœal colic, I come to the complications of the second period, called the period of eruption. Strictly speaking, these complications do not belong to the second stage. For example, the capillary catarrh which often accompanies this stage, began with the disease. In many cases, no doubt, it more specially belongs to the second stage, inasmuch, as though it begins to show itself in the first stage, it does not assume a serious character till it bursts forth about the sixth or seventh day of the disease, that is to say, on the second or third day of the second stage, or period of eruption, taking the form of suffocative catarrh, lobular, or pseudo-lobular pneumonia. In a word, simple catarrh is a symptom naturally belonging to the period of invasion, whereas suffo-

cative catarrh, peripneumonic catarrh, and pure pneumonia, belong more to the period of eruption.

Peripneumonic catarrh, lobular pneumonia, and pseudo-lobular pneumonia, the extreme consequences of capillary catarrh, are always the most formidable complications of measles, being much more dangerous than pure pneumonia or pleurisy: it is by capillary catarrh and its consequences that the greatest number of morbillous patients are carried off. When in a case which has gone on regularly till the seventh day, you then observe the eruption grow pale, and next day find an increase of fever, you have reason to apprehend a complication; and almost invariably that complication will be found to be pulmonary. In the adult, it may be an attack of pure pneumonia; but that is not usual, broncho-pneumonia being the most common form of the pulmonary affection. In children, this broncho-pneumonia, this peripneumonia is, I may say, the absolute rule, so rare are the exceptions: the inflammation of the pulmonary parenchyma is merely an extension of a previous bronchitis, in which the catarrhal element still predominates. It is all the more important to have clear views on this point in etiology, and upon the nature of the pathological process, that they at once explain the cause of the great danger of this complication of measles. The pneumonic complication nearly always proves fatal in children under three years of age. In an epidemic which I observed at the Necker Hospital in the years 1845 and 1846, out of twenty-four children who had measles, twenty-two died of peripneumonic catarrh: the other two escaped the terrible thoracic complication. This statistical fact enables you to estimate the frightful severity of this affection, which, however, is met with much more frequently in hospital than in private practice. Still, in some epidemics, it commits cruel ravages beyond nosocomial influences; and the physician who considered measles a mild disease till he encountered one of these epidemics, will afterwards modify that opinion. Thirty-seven years ago, when I began the practice of medicine, the first two patients to whom I was called were persons suffering from measles, one a girl of eleven, and the other a female servant of twenty-one years of age. Both sunk under broncho-pneumonia, which in one of the cases was complicated with pleurisy. At that period, I came to the conclusion that measles might prove a serious malady: from that time, many years elapsed without my losing a single case, child or adult, from the disease, and then I met with the disastrous epidemic at the

Necker Hospital. This year I have again seen a great mortality in my own private practice, and in consultation with my colleagues, both among children and adults, from morbillous peripneumonic catarrh.

Whenever, therefore, about the eighth day of measles, the fever, which ought to subside on that day, continues; when the subcrepitant râles, heard on auscultation from the fourth day of the disease, and which at the time the eruption came out (or at least about the second or third day of the period of eruption), ought to have become less fine, do not undergo that modification, there is reason to fear untoward pulmonary symptoms. The broncho-pneumonia is at first only characterised by general signs, and by the persistency and greater intensity of the fever; but by-and-bye, the bronchial blowing will exist as a pathognomonic indication of the affection, under which, sooner or later, the patients will succumb.

The nature of this complication explains its obstinancy. Catarrh is the most obstinate of all pulmonary affections, as well as the most uncertain in its course. Does not the simplest cold sometimes last longer than a pneumonia? Do not these inveterate bronchial affections keep people coughing for months, while a pure inflammatory pneumonia is generally a transient illness? We can, therefore, understand the persistency of a pulmonary affection in which the bronchitic element predominates. Apart altogether from the morbillous influence, bronchial catarrh is an exceedingly tedious malady in children. Its custom is to give way for a short interval and then reappear, subsiding and reappearing, it may be, two, three, or four times before final recovery is established at the end of two or three months. Likewise, after the lapse of two or three months, it may prove fatal. As the pulmonary affection in measles is essentially catarrhal, it is not surprising that the broncho-pneumonia should last thirty or forty days both in adults and children. Independent of catarrh, its essential element, morbillous broncho-pneumonia possesses a virulence of its own, which is the expression of a principle, specific, contagious and septic, which increases its obstinacy and severity.

The same obstinacy which characterises morbillous peripneumonic catarrh is met with in other external manifestations of measles. Thus, the simple ophthalmia, which is part of the disease, may go on for months. This exanthematous ophthalmia, as it has been called by Wardrop, is sometimes formidable, leading to granular

and ulcerated conjunctiva, phlyctænula, and pterygion. Mackenzie states that he has seen cases in which the eye was destroyed by violent muco-purulent ophthalmia consequent on measles. Such cases, however, are rare. In general, the affection is limited to a more or less decided redness of the conjunctiva, accompanied by intolerance of light, moderate pain, and lachrymation: but I repeat, that these ophthalmic affections are very obstinate, from the influence of the specific morbid cause on which they depend. Cases of purulent ophthalmia often have their starting-point in measles.

The remarks which I have now made on inflammatory affections of the conjunctiva are equally applicable to inflammations of the nasal mucous membrane. Are there not many children and adults who, free before measles from all these evils, have afterwards chronic eczema of the nasal fossæ, eczema invading and causing tumefaction of the upper lip, and sometimes extending into the posterior nares, even into the Eustachian tube, where it occasions swelling, which in its turn causes deafness?

These inflammations of the eyes and nose may lead to serious consequences. When child or adult of scrofulous diathesis is attacked by measles, the latter may, like scarlatina, give development to the already declared or hitherto latent morbid tendencies. These morbillous inflammations may be the starting-point of the evolution of the scrofulous diathesis, which will put its stamp on the lesions of which we are speaking, determining glandular swellings going on to suppuration, and leaving indelible cicatrices.

These manifestations of diathesis are not the only manifestations of this kind to which measles may give rise. In children who have been rapidly carried off by it, we often find bronchial glands more or less considerably engorged. Just as in scarlatina, we find engorgement of the glands of the neck, and in dothienteritis engorgement of the glands of the mesentery, so in measles we find engorgement of the bronchial glands. This condition is the consequence of the inflammation of the bronchial tubes, just as cervical adenitis is the consequence of the pharyngeal sore throat of scarlatina, and mesenteric adenitis the consequence of the intestinal inflammation in putrid fever.

When the catarrhal inflammation of the bronchial tubes is of long duration, and the patient is in subjection to the tubercular diathesis, the glandular engorgements assume the characteristics of that diathesis: on dissection, we find the glands converted into

tubercular masses. This remark is applicable to childhood, adolescence, and adult age. At all ages, measles may occasionally become the cause of the development of tubercles, when the individual carries within him the hereditary germ of the disease; and tubercular disease runs its course with much greater rapidity when its start has been accelerated by the exanthematous fever. It is under such circumstances that phthisis takes the acute form: it is rapid, but it differs greatly from the galloping consumption of typhoid form, regarding which I shall afterwards have to speak to you.

I have already told you that measles may determine an attack of otitis. It is generally only a catarrhal affection: but the inflammation may extend from the external auditory passage to the middle ear, whence it may be continued to the mastoid cells and petrous portion of the temporal bone. The situation of the patient is then very hazardous: for caries of the bone may lead to abscess of the brain, and inflammation of the mastoid cells may produce purulent infection. One of your masters, Professor Gosselin, has found that inflammation of the osseous tissue, or more correctly osseous phlebitis, is the most active of all the causes of purulent infection; and this condition exists when there is inflammation of the mastoid cells and temporal bone. I am indebted to my former pupil Dr. Peter for the particulars of a case which beautifully illustrates what I have now been saying.

On the 3rd April, 1865, Dr. Peter was sent for to Boigneville, to see in consultation a boy of twelve years of age who was dying from the after-disorders of measles. Two months previously, he had had the eruptive fever at one of the colleges of Paris. During his convalescence, his relations resolved to take him home with a view to hasten his recovery. At that time he had no cough, nor other symptoms of thoracic complication: moreover, he was of a robust breed; and there was nothing to lead to the supposition that tuberculosis was impending. All that remained of his attack of measles was an inflammation of the left ear, from which there was a profuse discharge of exceedingly fetid greenish pus. Six days before the consultation with Dr. Peter, the young convalescent had been seized with violent shivering, soon followed by sudden intense pain in the right scapulo-humeral articulation. From that time he kept his bed, lost his appetite, and had daily paroxysms of fever with repeated rigors. Four days after the attack of pain in the shoulder, he had a similar seizure in the right coxo-femoral articulation.

When Dr. Peter saw the patient, there were enormous swellings in the right shoulder and right haunch, and an œdematous puffiness over the chest, abdomen, thighs, and the parts in the vicinity of the affected joints. He could not in any degree spontaneously move the affected joints, and every movement communicated to them by others occasioned frightful pain. He was in a high fever, the pulse beating 160 in the minute: he had dyspnœa, with fine râles disseminated over the chest: and was in a state of constant low delirium. He was, moreover, suffering from jaundice, the date of which could not be ascertained, and regarding which there did not seem to be anxiety. Two facts were elicited by percussion over the liver; viz. that it was greatly enlarged, and that at certain points it was painful on pressure. Dr. Peter, connecting the jaundice with the state of the liver, the state of the liver with the articular lesions, the articular lesions with the pains which had preceded and the shivering which had accompanied them, concluded that it was a case of purulent infection; and he likewise inferred that there were metastatic abscesses in the liver, perhaps also in the lungs, and that there was unquestionably suppuration in the joints. Without hesitation he recognised as the starting-point of the purulent infection, the deep-seated otitis, with its associated caries of the mastoid cells and petrous portion of the temporal bone. Everything concurred to justify this induction. There was the character of the suppuration —its profuseness, and excessive fetor (so characteristic of osseous suppuration), and its abrupt suppression on the occurrence of the shivering and articular pains. This diagnosis was accepted by the physician in charge of the case, who had, however, at first concurred with a physician of a neighbouring town in the perfectly inadmissible hypothesis, that it was a case of acute tuberculosis of the articular extremities. The unhappy parents, dismayed at Dr. Peter's prognosis, called in my friend Dr. Blache next morning, who made exactly the same diagnosis. The patient died during the day.

I entirely concur in Dr. Peter's diagnosis. I feel convinced that there was purulent infection in this case; and making a retrospective review of other cases I have seen, but have not very exact notes of, I explain them in the same way. Be guarded then, gentlemen, in your prognosis, when you meet with deep-seated otitis as a sequel of measles or scarlatina: be assured that the inflammatory action is not simple, that it derives an exceptional gravity from the eruptive

fever, and exists in a subject whose organism has been thereby seriously impaired.

Gangrene of the mouth and vulva occur as sequelæ of measles, particularly in hospitals appropriated to young children. These affections are well known to the sisters attached to the service of the hospital in the rue de Sévres: when they have to nurse cases of measles, they take double precautions to secure cleanliness, particularly in respect of the little girls under their charge. When these precautions are neglected, small excoriations are seen on the vulva. In themselves, there is nothing serious in these excoriations, which are produced the more easily that the mucous membrane of the genitals is not more exempt than the other mucous membranes from morbillous influences. But if the patient is in the midst of concentrated epidemic influence, such as too commonly exists in a children's hospital, the excoriations on the vulva may become a way of entrance for gangrene. The affection may at first escape notice, but a considerable swelling soon appears at the side of the labia majora and probably extends into the groin. The skin over the tumour is of a bright red colour, the subjacent tissues are hard, and examination by the touch leads to the diagnosis of a deep-seated abscess. On separating the vulva, we discover pultaceous concretions of a whitish, sometimes of a greyish colour: they have generally a very fœtid odour, and sometimes extend back to the anus. Under such circumstances, there is no time for temporising: energetic treatment must be immediately resorted to. The day after the appearance of the concretions, the cellular tissue may be in a state of gangrene, and the labium sphacelated in its entire thickness. The gangrene may invade the vagina, and even perforate the peritoneum, in which case death rapidly ensues. The danger can only be averted by prompt and vigorous treatment. Cauterize the parts with fuming hydrochloric acid, nitrate of silver, or sulphate of copper; and if the caustics are not sufficient to stop the progress of the gangrene, you must resort to the actual cautery, then your sole resource.

Diphtheritis may sometimes also have measles as its starting-point. When such is the case, it generally assumes a malignant character, whether developed in the mucous membrane of the vagina, or in the folds of the skin, where in children the nature of the skin is so similar to that of mucous membrane; or whether, as is most usual, it appears on the mucous lining of the mouth, pharynx, and nose.

Purpura is another serious complication of measles, regarding

which I said a word at the commencement of this lecture. It presents itself in a form very different from the *morbus hæmorrhagicus* of Werlhoff, and very different also from the acute purpura with which we are acquainted. I have only seen two cases of this complication of measles.

Fifteen or sixteen years ago, I was asked to meet Dr. Coquerel in consultation, in the case of a girl of five years of age who had just had an attack of measles. The fever had been constantly accompanied by stupor, which is unusual in this disease. The eruption came out: but the exanthematous patches were of a dark colour—that hæmorrhagic hue which does not disappear under pressure of the finger. On the eighth day, slight delirium supervened, and epistaxis, which had occurred with usual moderation during the first period, became much more profuse. The relations, alarmed at the nasal hæmorrhage, called me in. The child had lost a great deal of blood. We recommended nasal injections of decoction of rhatany, of very warm water, of a solution of sulphate of zinc, and of a solution of sulphate of copper. The epistaxis moderated. After some hours, however, other hæmorrhages supervened: she had hæmaturia, bloody stools, and hæmatemesis. Finally, within two days, ecchymotic spots appeared on the back; and the child sunk in a state of extreme anæmia. We did not obtain an autopsy: but judging from what I have seen in the bodies of persons dying under similar circumstances, I think we should probably have found ecchymosis around the kidneys, under the peritoneum, and also perhaps (as is occasionally met with) under the coverings of the heart, and under other visceral membranes.

It thus appears, that in certain conditions difficult to appreciate, but in which very probably the epidemic constitution plays its part, the poison of measles may impart a special character to this terrible form of hæmorrhage, just as small-pox does sometimes, with this difference, that in black small-pox the hæmorrhages generally occur in the first, and in measles, in the last period of the disease.

Dr. Chairou in a remarkable work, to which a prize was adjudged by the Academy of Medicine, has given the history of a very severe epidemic of measles which prevailed at Rueil in 1862. It was characterised by the exanthem not having much intensity, and in being accompanied by profuse perspiration, and a vesicular eruption analogous to the miliary rash of lying-in women. Dr. Chairou proposed to give it the name of sweating-measles [*rougeole-suette*].

For my own part, I do not believe in such a complication of measles as sweating properly so called, any more than I believe in lying-in women being attacked by miliary fever. However, the Rueil epidemic was characterised by very unusual phenomena. From the first, in addition to epistaxis and vomiting, typhoid complications were observed, and at a later period of the attack, thrush, aphthous ulcerations, and ulceration of the periosteum leading to necrosis of the maxillary bones. Numerous abscesses in the face and neck were seen, such as are often observed in small-pox and scarlatina. The other mucous membranes were often coated with diphtheritic secretion, and the skin, under the influence of blisters or from other causes, was liable to excoriations. To these symptoms, convulsions were frequently added, and their occurrence, even at the beginning of the attack, almost invariably foretold a fatal issue. The mortality from this epidemic of measles was as great as that resulting from ordinary epidemics of typhoid fever.

As I have already stated, the nervous complications of measles generally occur at the beginning of the attack: they may, however, recur in the last stage of the disease, when they are not dependent on the fever itself, but on some superadded cause. For example, when broncho-pneumonia and peripneumonia supervene in children who have had convulsions at the period of invasion, these pulmonary affections may occasion a return of the convulsions, which are then preceded and followed by cerebral disturbance characterised by stupor. The fits last for two, three, or four days, or sometimes only for a few hours or minutes: they generally carry off the patient. The nervous complications of the last stage of measles, which originate generally in a formidable chest affection, are never met with in infants.

Measles, then—the complications of which I have now reviewed—may terminate in convulsions; but it must be remembered, that convulsions at the beginning of the disease are not serious, whereas in the last stage—that is, after the eighth day—they involve the worst possible prognosis.

LECTURE VII.

RUBEOLA.

Very Different Disease from Measles.—Stands in the Same Relation to Measles as Chicken-pox to Small-pox.—Does not produce Catarrh of the Mucous Membranes.—No Serious Sequelæ.—May attack the same person more than once, and does not confer Exemption from Measles.

Gentlemen:—A great many physicians fell into the same sort of confusion regarding rubeola as that which still prevails regarding chicken-pox. Rubeola was once considered a modified form of measles, just as chicken-pox has been looked on as modified small-pox. Although some authors still confound variola and varicella, all agree that there is an essential difference between rugeola and rubeola. Though they admit that there is at first view an apparent similarity between the latter two, they describe rubeola, the exanthematous fever, about which I am now going to say a few words, as a perfectly distinct nosological species. This disease was known to old authors under the various names of *rubeola, roseola,* and *exanthème fugace:* it is called *essera Vogelii* by Borsieri.

Rubeola is, like measles, characterised by an exanthematous eruption consisting of irregular spots, the outbreak of which is almost always preceded by febrile phenomena. The general symptoms which show themselves usually for one or two, and rarely for three or four days, are much less marked than in other eruptive fevers. Sometimes, they do not amount to more than a slight feeling of discomfort. Generally, however, the feeling of discomfort is considerable, and is accompanied by well-marked fever, rigors, headache, loss of appetite, urgent thirst, excitement, or, it may be, by great prostration. In very young children, it is not unusual for the disease to set in with vomiting, diarrhœa and convulsions.

The circumstance, however, which at once distinguishes rubeola from measles is the absence in the former of catarrh (ocular, nasal, and bronchial), an essential prodromic phenomenon of morbillous fever. The lachrymation, coryza, and cough which belong to measles are never seen in rubeola.

There is a great difference between the eruption of the two diseases. The rubeolic do not, like the morbillous patches, project from the surface of the skin. The rubeolic patches are paler, larger, more distinct from one another, and more isolated by intervals of unaffected skin: they disappear under pressure by the finger, and immediately reappear when the pressure is removed: they occasion intense itching, and are, to use Vogel's expression, *ardentes et prurientes*.

They are situated on all parts of the body, but are most abundant on the trunk and limbs. They do not present the regularity of the morbillous patches in the way they come out, their progress, and mode of disappearing. Exceedingly fugitive, remaining visible for twenty-four or forty-eight hours, they in some cases disappear, without desquamation and without leaving any trace of their passage; and they disappear and reappear alternately for seven days.

When once the eruption has finally disappeared, the malady is at an end, and there is nothing to fear from complications so threatening in convalescence from measles. Nor are there, as in the latter, any unfavourable symptoms to be dreaded in the prodromic or eruptive stages.

Rubeola is the mildest of the eruptive fevers. It is never a serious malady, and always terminates spontaneously without the physician being required to interfere. It has sometimes prevailed as an epidemic, as Frank states; and though the contrary has been held, I believe that it is a contagious disease. I do not say that it is contagious in the same degree as measles, but among the various causes of rubeola, I hold that contagion incontestably has a place.

The leading fact which enables us to separate rubeola from rugeola, is that an attack of the one does not protect from an attack of the other, any more than an attack of varicella protects from an attack of variola, or of variola from varicella. Again, the same person does not generally contract measles more than once: but one attack of rubeola does not protect from other attacks. Borsieri, indeed, has said that a person who has had it once is more liable to have it again:—"*Qui semel iis laboravit, facile iterum pluriesque prehenditur.*"

Persons of all ages and both sexes take rubeola; but women are more susceptible to it than men, and children are more susceptible than either. A hot season, or to speak more correctly, a high temperature, by exciting to copious perspiration, has a great influence upon the production of the rubeolic exanthem. I shall have occasion to return to this subject when I specially discuss the question of sudoral eruptions. I will then tell you how to distinguish the varieties of rubeola occurring in the course of other diseases. For the present, I will only remark that syphilitic rubeola cannot be included among them. Nature, pre-eminently specific, has placed a special stamp upon the venereal disease of which a form of rubeola is a characteristic manifestation: the course and duration of *rubeola syphilitica* point out that it is not a variety of the exanthematous fever I have been speaking of, but an affection belonging to another nosological group.

LECTURE VIII.

ERYTHEMA NODOSUM.

A Specific and Separate Disease.—Successive Eruptions.—Articular Pains.—General Symptoms.—A Possible Manifestation of the Rheumatic Diathesis.

Gentlemen:—You will only find a few lines devoted to the subject of erythema nodosum [*erythème noueux*] in your pathological text books. Authors seem only to mention it, that it may be remembered as one of the principal varieties of erythema, the whole history of which they give in one short chapter. Their descriptions appear to me insufficient; for the malady, a case of which I am going to show you in the wards, deserves to occupy a much larger space in nosological manuals.

Correctly speaking, and notwithstanding the generic title by which it is known, and to which for want of a better name I adhere, erythema nodosum is no more a variety of erythema than small-pox is a variety of ecthema, although, considered by itself, the variolous pustule often resembles, and may be mistaken for, a pustule of erythema. Erythema nodosum is a specific and separate disease, which manifests itself locally by characters so precise as not to admit of being mistaken. It also presents a group of general symptoms necessary to be taken into account. They almost always precede the appearance of the erythematous eruption, and are no more dependent upon the local cutaneous affection, than the prodromic fever of small-pox or measles is subject to the influence of the eruption which is going to come out.

The local manifestations of the erythematous eruption seem so very well known, that it might be sufficient to indicate them in a few words. I think, however, that it will be useful to describe them in detail. Any one of you will be able to recognise at a glance the

spots more or less regularly oval, elevated towards the centre, the size of which varies from that of a few millimeters to two or three centimeters, of the diameter of a pea, a hazel-nut, or even a walnut. They project above the skin, forming real knobs or nodes. They rapidly increase in their elevation above the skin, and become small hard tumours of peculiar aspect. They are circumscribed in such a way as to look as if their base was set in the thickness of the skin and cellular tissue, and as if they could be seized between the fingers. On their first appearance, they are of a red colour, which is the brighter the less the distance is from the centre, and this colouration extends beyond the nodosity. Passing from red to violet-red, it afterwards acquires a yellowish ecchymotic tint, or, gradually fading, gives place to a bluish tint, most decided towards the circumference of the nodosity, and easily disappearing under the pressure of the finger. I have never seen these tumours pass into a state of suppuration, although on pressing them I have felt a sensation of deep-seated fluctuation: in a few days spontaneous resolution has taken place. According to Professor A. Hardy, however, erythema nodosum may become chronic by the appearance of a succession of eruptions during several months, or even, it may be, during one or two years. When the disease takes this chronic form, the nodes on the legs sometimes become elongated, and then soften and ulcerate. The ulcerations are round, excavated, and of a greyish colour at the bottom: they resemble syphilitic ulcers. The attentive observation of the patient, the existence of non-ulcerated nodes, and an examination of the history of the case will prevent you making an error in diagnosis. This unusual aspect of the disease, this chronicity of erythema nodosum whether accompanied or not by ulceration, according to my colleague of the St. Louis Hospital, is dependent on a scrofulous taint. I dare not affirm, gentlemen, that the chronic erythema which I have described to you is the same disease of which M. Hardy speaks. Possibly, an anomalous cutaneous affection suggested to that able physician an opinion which I hesitate to adopt.

The favourite seats of erythema nodosum are upon the legs and arms, in situations where the skin is separated from the bone by a very thin layer of soft parts—on the forearm at the posterior edge of the internal aspect of the ulna, and on the leg on the inner aspect of the crest of the tibia. It is in this latter situation that the characteristic nodulated form of the tumours is most conspicuous. So

sensitive to pressure sometimes are the nodes over the tibia, even when lightly pressed, that the patients cannot tolerate the pain caused by the weight of the bed-clothes. The nodes are usually disseminated, separate [*discrètes, distinctæ*], and few in number; but at other times, they are more numerous, and in some cases become confluent from new nodes springing up beside former ones, and the two sets getting blended together, so as to form patches of greater or less size, of a more or less bright red colour, with irregular edges, somewhat resembling erysipelas, in their general appearance.

Although erythema nodosum has a predilection for the situations I have mentioned, it not only appears on all parts of the skin, but also on the mucous membranes. In a woman, whose case I am about to recall to your recollection, you saw an erythematous patch on the conjunctiva of the left eye. This patch on the conjunctiva is a pimple rather than a true node; and the spots on the thighs, arms, neck and face in erythema nodosum are generally papular. By-and-bye, when I come to speak of papular erythema, I will recall to your recollection the differences between the two forms of erythema, mentioning at the same time the phenomena common to both, and by which they seem to be assimilated; but I will now anticipate what I have to say by remarking, that it is very rare to see a case of erythema nodosum without pimples, while nodes are seldom seen in papular erythema.

The eruption does not always all come out at once, but sometimes in successive crops, fresh nodes appearing in succession before their predecessors have faded. New crops go on appearing at longer or shorter intervals, the period of eruption being sometimes thus prolonged to twenty-one days. The duration of the acute stage of the disease is from one to twenty-one days. So long as the general symptoms continue, and the fever does not abate, the appearance of new spots may be expected.

I shall now state what took place in the case to which I have just alluded. The patient, a woman of 57 years of age, was admitted on the 15th December to bed No. 25 *bis* in our St. Bernard ward. She said that she had been ill for ten days: she complained of general discomfort, headache, articular pains in the left shoulder, and want of appetite: the tongue was red, the skin hot, and the pulse 100. I detected erythematous spots on the right thigh, and internal aspect of the right elbow. No abnormal sound was heard in the heart on

eareful auscultation. Next day, a spot appeared on the right arm, and a new spot on the left, in the same situation as the other. In respect of hardness, the spots resembled syphilitic gummæ. On the 17th December, the eruption appeared on the external aspect of the left thigh, and the fever continued unabated. On the 18th, the spots were still more abundant, and some of them were papular. The tongue, red at the point and edges, was covered with a whitish fur. The pulse was still 100, and the skin hot. On the 20th December, we observed spots on both arms over the inferior portion of the ulna. On the thighs, the spots were confluent; and round one of the knees, the confluence was so great as at a first glance to suggest erysipelas. This was the day on which we saw an erythematous spot on the conjunctiva, at the outer angle of the left eye. There was some abatement of the fever: but on the 22nd, it had regained its former intensity. On the same day, there was a fresh crop of spots; and the patches on the right thigh, some of which were as large as a five franc piece, were bright red, and very painful. The pain in the shoulder was more violent than when my attention was originally directed to it, and it was increased by the slightest pressure. The erythematous spot on the eye had faded, and there only remained in its place a little injection of the conjunctiva. On the 23rd and 24th, new spots appeared on the legs: on the 24th, however, the fever subsided considerably, and the pain in the shoulder greatly diminished. No fresh spots appeared after the 25th. From that day the patient felt much better, and convalescence began. She left the Hôtel-Dieu, completely recovered, during the first week of January.

Convalescence, gentlemen, is sometimes tedious, almost as protracted as in some putrid fevers.

The articular pains which precede and accompany the eruption seem to me to be characteristic of *erythema nodosum*. The general symptoms consist in a universal feeling of discomfort, in lassitude and aching of the legs, headache, want of appetite, and a loaded state of the digestive canal; and in fever more or less severe during a prodromic period which varies in duration from one to five days. When once the eruption is accomplished, recovery generally takes place in one, two, or three weeks; but again I repeat, that the duration of the malady may be much more protracted, and that so long as the general symptoms continue new eruptions may be looked for.

Articular pains are complained of almost at the same time that the general symptoms set in; they sometimes continue as long as the eruption lasts, and even after it has disappeared. They come on spontaneously, are aggravated by pressure, are sufficiently acute to hinder movements, and sometimes even entirely to prevent them, as was the case in a young woman in our St. Bernard ward who kept her fingers flexed from inability to extend them. They are sometimes limited to a single articulation, and in other cases, as in the young woman just referred to, they extend to all the joints. The pain is sometimes as acute as in pure rheumatism; but I have never seen redness or swelling in the situation of the affected parts; nor have I ever found signs of cardiac lesion.

The existence of these articular pains seems to indicate that erythema nodosum is of the nature of rheumatism. The best authors have pointed out the mutual relations of rheumatism and erythema nodosum. This has been done in France by Dr. Bouillaud,[1] and in Germany by Professor Schœnlein, who has given to erythema nodosum the name of rheumatic purpura. Dr. Bazin, an accomplished physician of the St. Louis Hospital, has not hesitated to place it at the head of his pseudo-exanthematic erythematous *arthritides*; and Rayer[2] has described a papular erythema occurring in persons suffering from acute rheumatism, which to the eyes of Dr. Bazin is erythema nodosum itself.

I was formerly in the habit of attaching a great deal of importance to the articular pains, and tried to subdue them by giving preparations of sulphate of quinine, or veratria. Afterwards, from a study of the natural course of the disease, I perceived that they generally yielded without the intervention of art, and I then restricted my treatment to keeping the patients in bed, and telling them to avoid chills. These hygienical means and cooling drinks now constitute my whole treatment of these pains. When the stools are slimy, and indicate a loaded state of the digestive canal, I endeavour to correct that state by administering mild purgatives.

Erythema nodosum is not a common disease of children, but I cannot exactly say that it is rare among them. One of my pupils lately told me that he had seen it in two brothers, one aged two and a half and the other four years of age.

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[1] Bouillaud:—Traité Clinique du Rhumatisme Articulaire. Paris, 1840.
[2] Rayer:—Traité des Maladies de la Peau. Paris, 1835.

LECTURE IX.

ERYTHEMA PAPULATUM.

Differs from Erythema Nodosum in the Form and Seat of the Eruption, and in the Severity of the Symptoms.—Rheumatic Character.

Gentlemen:—Although erythema papulatum [*erythème papuleux*] and erythema nodosum have obvious affinities with each other, I should not wish you to take up the idea that they are identically the same disease. They have undoubtedly something in common, just as small-pox and chicken-pox have something in common; but in my opinion, they possess characteristic differences which allow us to regard them as two distinct species. Recall, gentlemen, the marked difference between the physiognomy of disease in two women whom you saw with erythema nodosum, and in three patients with erythema papulatum, two of whom are in the St. Bernard ward, and one in the St. Agnes ward. The patients with erythema nodosum presented, relatively to the other group, very mild symptoms, though the cases were severe for the affection; while the three with erythema papulatum had very formidable symptoms, so formidable in one of them as to occasion death. Do not suppose, gentlemen, that the disease is formidable in proportion to the intensity of the eruption, as is the case in small-pox and scarlatina. The forms, the seat and the mode of evolution of the eruption are so various as to establish the diversity of the nature of the two diseases. Again, erythema papulatum is accompanied by serious pulmonary lesions, and sometimes by articular rheumatism and endocarditis, whereas erythema nodosum has no such accompaniments, or at least is not attended by pulmonary lesions. You will easily understand this distinction, when I recall to your recollection the history of cases which you have had an opportunity of studying with me in the clinical wards,

and which you will be able to compare with the history of cases of erythema papulatum. Let me first recapitulate the case of the man who occupied bed No. 24 in St. Agnes's ward.

He was an assistant-cook, who had lived in Paris for the four months preceding his attack, during which period he had enjoyed good health. He was admitted into hospital on a Friday. On the previous Sunday, he had felt, as precursory symptoms, stiffness and pricking in the eyes. He also experienced pains in the wrist and joints of the middle finger, which on the following day became so violent as to interfere with the movements of the parts affected, to the extent of preventing him from opening and shutting the hand. In the evening of the same day, he had pains in the knee. There were, however, neither fever nor loss of appetite. From the Sunday also, he had perceived on his hands an eruption of uniform redness. On the Tuesday, the backs of both hands, the cheeks, and the forehead were covered with pimples, and there was some fever. Upon his admission into hospital, I observed this papular eruption, upon a ground of a winy-red hue, raised above the parts of the skin which were not affected. Besides some pustules of acne on the inferior extremities, we saw a small patch of erythema nodosum on the left leg: this patch was painful. In no other situation than those named did we find any trace of eruption, except in both conjunctivæ, the sclerotics of which were injected with livid red. The edges of the eyelids were also red. On the Thursday following—the seventh day after admission and the twelfth from the beginning of the attack—I observed a little obstruction of the lungs characterised by cough and mucous sub-crepitant râles in the posterior part of the base of the left lung. The patient, nevertheless, asked for food and did not remain in bed. Two days afterwards—on the fourteenth day of the malady—the erythematous patches were much paler, but new pimples had come out in the situations in which they had been first seen. For forty days, his general condition was very unfavourable, and the fever continued. There were five or six successive eruptions. The patient became exceedingly thin; and on the sixtieth day from his seizure, he was as weak as if he had had an aggravated attack of dothienteria.

In connection with the case now detailed, I will relate that of a woman who lay in bed No. 11 of St. Bernard's ward, in whom the disease proved rapidly fatal. Her age was sixty. She had long suffered from pulmonary emphysema, and on admission had bron-

chitis accompanied by fever, and a state of stupor which to me did not seem to be dependent on the state of the bronchial tubes. For several days, the chest was auscultated with very great care, with a view to discover whether there was any point affected with peripneumonia. Three days after admission, erythema nodosum was detected on the legs and erythema papulatum on the backs of the hands. This woman, by occupation a washerwoman, had had several attacks of rheumatism, and it was through exposure to cold and damp that she had contracted the catarrh which brought her to the hospital. The bronchitis soon became general, and on the twentieth or twenty-first day terminated fatally, having become complicated with double hypostatic pneumonia. On examination after death, we found sero-sanguinolent engorgement of the lower third of both lungs, and a muco-purulent fluid in the minute bronchial tubes.

You have lately watched the evolution of erythema papulatum in a woman who occupied bed No. 33 of the same ward, and whose life was in great jeopardy for more than fifteen days. I regard her case as one of the most conclusive I have met with in support of my opinion, that erythema is essentially a constitutional affection. Here are the facts drawn up by M. Dumontpallier:—

"A young woman of thirty-eight years of age, who, though a rheumatic subject, had enjoyed very fair health for several years, was admitted to the St. Bernard ward with all the symptoms of an attack of fever. She had general prostration, lassitude, pains in the legs, quick pulse, foul tongue, nausea, sweating, and constant headache. The patient had had these symptoms for several days, but there was nothing in their duration, nor in the predominance of any one of them, to lead us to suppose that the case was an eruptive fever; nor was there any ground for believing that an organic lesion existed. She merely stated that some days before she came into hospital, she had had pain in both knees. On the day of her admission, there was no trace of articular swelling, and no joint was the seat of decided pain: nevertheless, the persistence of the sweating and fever, combined with the dull white colour of the skin, suggested rheumatic fever. There was from her first day in hospital, moreover, a slight blowing sound audible over the apex of the heart. The question arose:—Was this abnormal sound the result of a lesion originating in previous rheumatism, or was it dependent upon existing sub-acute endocarditis? She had neither palpitation nor pain in the region of the heart. Not finding anything to account satis-

factorily for the continuance of the general symptoms for so many days, and having abandoned the hypothesis that they belonged to an eruptive fever, I examined the skin, to see whether I could discover any trace of an ephemeral eruption. The examination was not without results: on the arms and fore-arms, as well as on the thighs and legs, I observed an eruption of papules of various sizes. On the external aspect of the middle of the left arm, they formed slightly elevated confluent patches: they were of a rosy colour, soft to the touch, and disappeared on slight pressure, reappearing on the pressure being removed: it was observed that the papules were in several places grouped in such a way as to present the appearance of semicircles. Similar isolated patches were seen on the palmar aspect of the left arm and fore-arm. The patient was not aware of the existence of the eruption, which had occasioned neither heat not itching. On the anterior and external lateral aspect of the thighs and legs, there were a very few similar patches, which were but little elevated. She was astonished when we pointed out to her nodulated spots on the anterior surface of the leg: these spots were pale red, elevated above the surface of the skin, and rested on a bump as large as a small filbert-nut: here we undoubtedly had erythema nodosum. On the following days successive eruptions appeared, and they were beyond the possibility of doubt erythematous. In point of fact, new papules and new bumps appeared in crops, just as successive crops of eruption come out in chicken-pox on the arms and legs. The bumps were confined to the legs and one of the thighs. The erythema papulatum was particularly well marked in the left arm, in the situation of the insertion of the deltoid muscle: several crops of papules appeared there successively, and after three or four crops the papules were as red and raised as on any other part of the body. Simultaneously with each erythematous eruption, there was a febrile exacerbation, accompanied by rheumatic pains in the knee-joints, wrists, ankles, hands, and feet. The skin continued moist. Auscultation, which, from the day of the patient's admission, had revealed the existence of sub-crepitant râles throughout the whole of the posterior part of the chest, soon afterwards disclosed double pleurisy, unaccompanied by stitch in the side, and attended by very little cough. Over the inferior angle of both scapulæ, a blowing sound and egophony were heard. There was also effusion on both sides which did not ascend higher: it was more persistent on the left than on the right side. The fever lasted

for fifteen days after her admission. For the last two days, however, of that period, it was more moderate, the perspirations were less profuse, and there were no longer articular pains. There was no fresh eruption, and the old papules had entirely disappeared. The bumps were no longer appreciable to the touch, and no traces of their former existence remained except ecchymotic staining of the skin. The appetite had returned, the tongue was good, and the double pleurisy was undergoing resolution."

Upon comparing with each other all the facts in this case, you will find that they possess a common physiognomy. There was violent and continuous fever, profuse perspirations particularly at night, a very formidable pulmonary affection, and an illness lasting much longer than could have been anticipated from the first symptoms.

I do not wish, gentlemen, to omit stating some circumstances which seem to tell against my opinion. As I mentioned to you already, I have often met with erythema nodosum and erythema papulatum differing from each other, but have never seen a case of erythema nodosum in which there were not numerous papules, and I have sometimes met with true nodes in erythema papulatum. Again, in both we meet with articular pains and even endocarditis, though not so frequently in erythema nodosum as in erythema papulatum. I do not consider, however, that because these phenomena are common to both diseases, both are, therefore, identical. It is no more necessary to believe that, than to hold that scarlatina and small-pox are identical because a scarlatiniform eruption has been seen at the beginning of an attack of modified small-pox. There is unquestionably a great similarity between the ataxo-adynamic symptoms of typhoid fever and of pyæmia, but no one will deny that these two diseases are essentially distinct and different. In the cases which I have laid before you, it is difficult to avoid seeing a confirmation of the views of my colleague at the St. Louis Hospital, Dr. Bazin, regarding the *arthritides*. According to him both erythema nodosum and erythema papulatum are arthritic affections. Though they differ in form, he holds that they are identical in essence: they both spring from one common diathesis—the arthritic. This doctrine, eminently medical, explains our meeting with in the same patient on the one hand evidence of previous articular rheumatism, and on the other, the co-existence of the cutaneous eruptions with cardiac and pulmonary affections. It is not then ery-

thema papulatum which is formidable, but the diathesis of which it is an expression.

There are, however, cases of erythema papulatum exceptionally mild, which may in this respect be compared with cases of erythema nodosum. There is at this very moment in bed No. 33 of the St. Bernard ward a woman of fifty years of age in whom erythema papulatum is very confluent on the face and neck, and still more on the hands and fore-arms, but who is without fever, articular pains, gastric or pulmonary symptoms. Hence it is evident, that there are degrees of severity in erythema papulatum, as in any other eruptive disease; but this does not in any way go to prove that as a general rule one of the two is a much more serious malady than the other.

Gentlemen, erythema papulatum like erythema nodosum declares itself by general symptoms—by general discomfort, fever, and a suburral state of the digestive canal. These prodromic symptoms are usually met with, though they were absent in our patient in the St. Agnes ward. The duration of the prodromic period is variable, and lasts from one to five days. Along with these general symptoms, there set in, as in erythema nodosum, articular pains which are sometimes of such severity as to impede, or even completely prevent, the movements of the body: these pains continue during the eruptive period, and are often prolonged till after its conclusion. Endocarditis occurs in some cases, as you have had an opportunity of observing. Erythematous rheumatism, like scarlatinous rheumatism (which is much less severe and less obstinate than acute articular rheumatism), often assumes an exceptionally intense form.

The eruption consists of patches of a winy redness, sometimes placed near each other, and sometimes disseminated: they may be either quite round, or they may be of irregular shape. These patches, constituted primarily by small tumours painful to the touch, fade, flatten, and pass from a red to a violet-red colour. M. Hardy says that the patches are sometimes complete circles surrounding portions of sound skin. The eruption ends with slight desquamation. Vesicles have been observed on the patches: their duration is very ephemeral: they dry up quickly, leaving no trace behind, whether they burst or whether they disappear in consequence of their serous contents being absorbed. The eruption is often indolent. It may be accompanied by a feeling of heat, burning, or itching. It is a characteristic circumstance that

the eruption has a preference for the hands, fore-arms, face, and neck. It is less frequently seen on the inferior extremities, differing in this respect from erythema nodosum, which prefers the continuity of the limbs, and particularly the parts, where there is only a very thin separation between the skin and the bone. Erythema papulatum lasts for fifteen or sixteen days.

The treatment ought, as in simple erythema nodosum, to be restricted to preeautionary and hygienical measures. When the articular pains are not severe, no interference is called for. When the thoracic complications assume a formidable character, and when the rheumatism becomes general and invades the heart, the treatment required will just be that which is appropriate in cases of pleurisy, broncho-pneumonia, or polyarthritic rheumatism.

LECTURE X.

ERYSIPELAS; AND IN PARTICULAR ERYSIPELAS OF THE FACE.

Pathology of Erysipelas.—Almost always an Exciting Cause, independent of Individual Predisposition and General Cause.—May Supervene in the Course of Epidemics.—Severity increased by Traumatic Influence.—General Symptoms dependent on Inflammation of Wound and Lymphatic Vessels.—Delirium has not the Signification attributed to it in Erysipelas.—Erysipelas sometimes Contagious.—When not a Complication of another Disease is a Mild Affection which Subsides Spontaneously.—The Treatment ought to be Expectant.

Gentlemen:—We have at present several patients affected with erysipelas—a young girl in bed No. 6 of the St. Bernard ward, a young woman of twenty in bed No. 10 of the same ward, and a young man between twenty-five and twenty-six years of age, occupying bed No. 8 in the St. Agnes ward. The manner in which these three persons were seized was very nearly similar, and in all of them the erysipelas of the face has assumed the same form. In bed No. 4 of the men's ward we have seen a fourth patient with erysipelas; but his case has been invested with special interest in consequence of the course which the disease has taken.

This man, from the date of his admission, had a very violent sore throat, with consequent affection of the sub-maxillary glands. At my first examination of him I predicted that by the next visit the case would have declared itself as erysipelas of the face; and the event justified my prognosis. My opinion was founded on the presence of certain phenomena, to which I directed your special attention. Three days previously, the patient had experienced exceedingly severe pain in the throat; next day, the sore throat was well

marked; and on the day following, the severity of the pain had increased, while at the same time intense fever set in and a large glandular swelling formed at the angle of the lower jaw. On depressing the tongue and examining the pharynx, we found a vivid redness of the uvula, veil of the palate, and pillars of the tonsils. From these symptoms, I came to the conclusion, that the case was either catarrhal sore throat, or erysipelatous inflammation of the pharynx. But as catarrhal sore throat is in general not nearly so painful as erysipelas of the pharynx; as the swelling was not so great, as the redness was less vivid, as the fever was more severe and the cervical glands more swollen than is usual in the former, my ultimate diagnosis was erysipelas. With my diagnosis thus settled, I had to wait till the malady should proceed to the nasal fossæ, and by that route reach the face. Well! the erysipelas which during the night had begun to appear at the orifices of the nostrils, forthwith extended to the nose; next morning, the pain of the throat and the redness of the pharynx had disappeared, and the malady pursued precisely the same course which we see it follow, when we watch its evolution on the skin. From the nose, it extended to the cheeks, from the cheeks to the eyelids and forehead, whence it advanced to the hairy scalp, and so on it proceeded, till it had made the circuit of the head, resting from two to four days in one situation and then invading the adjoining place.

It is very important to be acquainted with this line of march which erysipelatous inflammation follows. Ten years ago, my friend Dr. Gubler was the first to point out that erysipelas of the face is only a propagation of the disease from the pharynx,[1] and not a metastasis as had before that been often repeated.[2] The propagation may proceed, as was also shown by the same able physician, in an inverse order; that is to say, the erysipelas may begin in the skin, and proceed from it to the mucous membranes. Erysipelatous inflammation of mucous membranes must not be confounded with other kinds of inflammation to which they are liable. In a practical point of view this is very important. No doubt, I shall have occasion to return to this topic in the course of my lectures. But

[1] Gubler:—Société de Biologie, 1856.

[2] Upon this subject, see the more recent researches of V. Cornil, entitled "Observations pour servir à l'histoire de l'Erysipèle du Pharynx [*Archives Générales de Médecine*, 1862]; and J. Ciure:—"De l'Erysipèle du Pharynx." [*Thèse Inaugurale*]. Paris, 1864.

to-day, gentlemen, the subject on which I have to address you is erysipelas of the face.

Do not suppose that it is my intention to give you a complete history of the disease; for that you will find in the text-books which are in the hands of all of you. Chomel and Blache, in the *Dictionnaire de Médecine*, and MM. Hardy, Béhier, and Valleix, in their treatises on internal pathology, have given exhaustive descriptions of erysipelas. I only propose, therefore, to speak at present upon some specialties in its pathogeny and treatment.

Surgeons for the most part are agreed that when erysipelas appears in the wards of a surgical hospital its presence is dependent upon traumatic influences. A patient, for example, after having undergone a trifling operation, such as the opening of an abscess with the lancet, or the making of a small cut in the skin for some other purpose, is, after an interval, affected with general discomfort: the glands in the vicinity of the wound become enlarged, those of the groin for instance, when the wound is on the inferior extremity, and those of the elbow and axilla, when it is on the hand. The erysipelatous redness soon appears. In such cases, the cause of the affection is evident: everybody readily recognises its mode of development: the existence of a predisposing cause either in the individual or in the circumstances with which he is surrounded is admitted: the existence is admitted of an epidemic constitution of the atmosphere in consequence of which the most insignificant operation, at other times unattended by any such risk, is immediately followed by erysipelas. But the affection so arising is always *traumatic*, and you must be careful to distinguish it from what is called *medical* erysipelas.

Many physicians are of opinion that medical erysipelas is not under the law to which surgical erysipelas is subject. According to Chomel and Blache, erysipelas is never the result of an external cause, and they say that if sometimes an accessory cause contribute to its production, it is only in a secondary manner. I think it is nearer the truth to say, that in the immense majority of cases both classes of causes are in operation. It is so, in the circumstances to which I have just alluded, when during an epidemic, cases of erysipelas seem to arise spontaneously; that is to say, without any appreciable exciting cause. Such of you as have attended the surgical wards know, that one or two years may elapse during which an attack of erysipelas is an unusual occurrence after an operation

however serious, and that at other times, the surgeon cannot make the slightest use of the bistoury without exposing his patient to this risk. This is the present state of matters. There is also now prevailing one of the severest epidemics of puerperal fever which has in recent times desolated the Maternity Hospital, where sixty patients have died within ten months from this terrible pestilence. At the very time when prudence compelled the physicians of that establishment to shut it up, and send the women to be confined in the other hospitals, erysipelas broke out in a severe form in a great many of the surgical services, among those who had wounds. The coincidence of puerperal fever and traumatic erysipelas has been pointed out long ago, and Graves has taken up the subject with precision in his clinical lectures: but it is to the Clinical Hospital of the Faculty of Medicine of Paris that we must specially refer for proof of the occurrence of this coincidence, as there, under the same roof, separate wards exist for surgical patients and for lying-in women.[1]

It is, therefore, an incontestable fact that under certain atmospheric conditions—under the influence of an unknown something in the air—individuals become disposed to take erysipelas from slight causes which would not have produced it at other times. Graves believes in this, and also in contagion. This is a subject to which I shall by-and-bye return, but I may now remark, that even when contagion operates, immediately exciting causes generally play a part not hitherto sufficiently appreciated. Observe with attention, and you will see, that the erysipelas described under the names of medical and non-traumatic (in contra-distinction to that termed surgical and traumatic), has almost always a starting-point, which though it cannot strictly speaking be called a wound, is at least a lesion—a very slight lesion it may be in some cases. In three of our patients, this was placed beyond doubt.

The young girl of bed No. 6 St. Bernard's ward had a suppurating pimple at the angle of the eye, which she scratched, and so excited in it an increase of inflammation. From this little breach of continuity, erysipelas started which progressively invaded the cheeks, forehead, and hairy scalp.

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[1] See the report of the long discussion on puerperal fever in the Academy of Medicine:—"De la Fièvre Puerpérale, de sa Nature et de Son Traitement:" Paris, 1858.

The woman occupying bed No. 10 had long had eczema of the nose, and there it was that the erysipelas commenced. From the nose, it extended to the eyes, face, and hairy scalp; in which latter situation it is now beginning to show itself, after having become extinct in the other places.

In the young man occupying bed No. 8 of the St. Agnes ward, erysipelas took the same course, having had likewise eczema of the nose as its exciting cause: and this is the third erysipelatous attack which this young man has had, the starting-point in each of them being his chronic eczema of the nose.

Again I say, therefore, observe carefully the cases you meet with, and in nearly every one of them you will find a small lesion of the integuments at some point on the face, such as the corner of the eye, the nose, the lips, behind the ear, or in the hairy scalp. This you will find in many cases to be a herpetic ulceration of the face, or of the mucous membrane of the throat; and sometimes inflammation of the gums dependent on the presence of a carious tooth. Finally, while it is quite necessary to take into account personal predisposition, and still more to admit the influence of a general predisposing cause (the nature of which is unknown though its existence is universally admitted by all physicians), a determining cause is also required for the production of erysipelas. This determining cause plays an essential, and not a secondary part, in the development of the disease.

If we grant that under certain circumstances, under epidemic influences, erysipelas is developed independently of traumatic causes, and quite spontaneously, it must also be admitted, that there are others in which it may at first be supposed that the determining cause is absent, but in which it is afterwards discovered.

You no doubt recollect a woman admitted into the clinical wards for erysipelas of the face and hairy scalp, in whom there seemed no proof of the disease having had a lesion of the integuments as its starting-point. Upon her admission, I carefully questioned her, when she denied having had any previous affection which could account for the attack: she affirmed that she had had no sore place on the ears, eyes, nose, or throat, and no breach of continuity of any description on the face or head. Here, then, seemed a case in which erysipelas had come of itself; but subsequently, upon resuming my interrogations, the patient mentioned that she had had violent pain in the ear, which for some time had affected her hearing, or, to use her own

expression, had made her hard of hearing. She then recollected that along with the pain in the ear and deafness, she had had at the same time an affection of the glands of the neck, that two days afterwards there appeared behind the left ear a red, smarting patch which successively took possession of the face and hairy scalp; and the presence of which we noticed at the time of her admission. Going back thus to the starting-point, we have been enabled to follow the course of the affection of the skin, and again to prove that a case which might have passed with many physicians as belonging to the class of erysipelatous cases reputed *medical* bore a great analogy, in respect of its starting-point, to what is called *surgical* or *traumatic* erysipelas.

There ends, however, the analogy; for that which we call traumatic influence [*traumatisme*] in speaking of erysipelas, is a something which imparts to that disease a formidable character altogether special. The truth of this proposition is demonstrated by what is seen after wounds of the face, and still more after wounds of the hairy scalp. The appearance of cerebral symptoms is looked upon as a usual and unfavourable occurrence in erysipelas of the head, while in reality such symptoms are not generally met with except in erysipelas of traumatic origin—using the term traumatic in its strictly accurate acceptation. This probably depends upon recently denuded vessels becoming the seat of violent inflammation and producing much greater disturbance of the economy than results from erysipelas determined by a small and partially cicatrised excoriation, or a herpetic ulceration of the nose, ears, or eyes. From this point of view, but only from this point of view, it is necessary to establish a distinction between surgical erysipelas which is often, and medical erysipelas which is seldom, fatal. It is of the latter that I have now to speak.

Medical is the name given to the erysipelas which proceeds from an internal cause. One reason why physicians give it this descriptive name arises from the circumstance that in numerous cases, the appearance of the cutaneous inflammation is preceded by fever, general discomfort, and disorder of the digestive function, indicating the impress of a pathological modality upon the economy. Considering erysipelas, then, as an eruptive fever, it has, following the example of Borsieri, been placed in the same nosological category as small-pox, scarlatina, measles, and all the exanthemata.

That, in my opinion, gentlemen, is a mistake. I do not deny

that in some cases the fever precedes the inflammation, but this is a rare occurrence, the rule being that the local inflammation precedes the general febrile excitement. It is not sufficiently observed that precisely the same phenomena occur in erysipelas of the face as in erysipelas of other parts of the body, whether the cause be external or internal. A person, for example, has a wound on the foot or leg which becomes inflamed and very painful, the lymphatic vessels and glands connected with it swell, and fever sets in, but some days elapse before the erysipelas appears around the wound. In this case, the fever cannot be looked on as similar to the prodromic fever of the exanthematous fevers: its existence is perfectly explained by the inflammation of the wound and lymphatics. The inflammation of the lymphatic vessels, or at least of the glands, precedes the appearance of the erysipelas: this is undeniable. Even Borsieri, while he called erysipelas an eruptive fever, stated that glandular engorgement was a symptom of the beginning of the attack: in the paragraph which he devotes to erysipelas he says:— "Illud etiam memoria probe tenendum est quod crebis ex observationibus constitit, si erysipelas artubus inferioribus incubiturum sit, inguinis et femoris glandulas conglobatas, vasis cruralibus additas, antequam se exerat, leviter dolere atque intumescere consuevisse, axillares vero ac cervicales, si brachiis *aut superioribus locis* immineat." Chomel, too, with whose views regarding erysipelas you are acquainted, mentions that painful swelling of the lymphatic glands in the neighbourhood of the seat of the disease is one of its most remarkable and constant phenomena.

On the other hand, gentlemen, we must not exaggerate the importance of this fact, and say with Blandin that erysipelas is nothing more than lymphitis. Velpeau has conclusively shown that lymphitis and erysipelas are very different affections; but the renowned surgeon of La Charité has in his turn fallen into the opposite extreme, in maintaining that adenitis is consecutive to erysipelatous inflammation of the integuments. Resting my opinion on my own personal experience, and on the authority of such observers as Chomel, I hold, that almost always the glandular engorgement precedes the outbreak of the erysipelatous inflammation, and also that it is dependent upon a local lesion in the situation of the lymphatic vessels communicating with the swollen glands. Like the woman of whom I have just spoken, patients will tell you that they have had, for example, an excoriation of the ear, or that

there was something the matter with the ear: they will also complain that the movements of the neck are accomplished with difficulty and occasion pain. There is, therefore, I hold, an inflammatory action anterior to any characteristic manifestation of erysipelas; and this action is quite sufficient to produce the general symptoms.

Finally, the prodromic fever of erysipelas, if this name be allowed, is a symptomatic fever [*une fièvre avec matière*]: it is a fever symptomatic of the inflammation propagated in the lymphatics communicating with the local lesion. This fever continues for one, two, or three days: the erysipelas then appears, and forthwith proceeds to the different parts of the face and hairy scalp, remaining stationary in one place for three or four days, and fading in the rear of its progress as it advances to another point. It advances rather slowly, taking eight or nine days, or sometimes more, to complete its circuit of the head. In a few exceptional cases, when it has gone once round the head, it makes a second circuit, starting generally from the place first affected. This repetition of the course is less frequently seen in erysipelas of the face than in that of other parts of the body.

The great severity of the general symptoms is a remarkable feature of erysipelas. There are few diseases in which the fever is so high, and the gastric symptoms so urgent. By some the gastric symptoms are regarded as the cause of the erysipelas, but I believe that the very opposite of that proposition is the truth, or in other words, I hold that the gastric disturbance is dependent upon the inflammation of the skin. I have often recalled to your recollection experiments of M. Cl. Bernard, which show that when fever is excited in an animal, the normal gastric and intestinal secretions are arrested. These results are often confirmed by what we see in medical practice; and in my opinion, the disturbance of the digestive functions, generally met with in erysipelas, is obviously the consequence of the fever.

Delirium occurs in erysipelas of the face, independent of these gastric symptoms. It is, at least in its aspect, a formidable symptom. There are very few cases which do not present cerebral symptoms when the erysipelatous inflammation reaches the hairy scalp. The patient occupying bed No. 8 of the St. Bernard ward has been delirious for two days, and his delirium will probably still continue for two or three nycthemera: it is not likely to cease till the erysipelas has in succession invaded and abandoned the different parts of the

skin of the head. Notwithstanding their apparently serious character, the nervous symptoms do not alarm me: experience has taught me that what is called medical erysipelas, provided it be not complicated with any other disease, is not a dangerous malady. The prognosis, however, is altogether different when it supervenes at the close of an acute disease, at the close of an attack of small-pox, scarlatina, dothienteria, diphtheria, &c., or during the course of a chronic malady such as phthisis, when it meets with a state of profound cachexia of the system.

Erratic erysipelas [*erysipèle ambulant*] is also a more serious affection than erysipelas limited to the head: it jumps from one place to another, and ranges over the trunk and every part of the body. The greater danger of this form of the disease does not arise from the symptoms being more severe than when the erysipelatous inflammation is confined to the face; for generally the fever is more moderate, and the occurrence of delirium is not so frequent. The greater danger consists in the disease being prolonged for one or two months, and so exhausting the patient's strength; unless, indeed, the physician, regardless of the high fever, prescribe nutritious diet with a high hand, there being no other means by which the destruction of the vital powers can be prevented. But there are some cases in which certain symptoms supervene not sufficiently noticed by our classical authorities: I allude to the extension of the erysipelas to the mucous membranes of the mouth, bronchial tubes, and alimentary canal. In the course of my lectures, I shall, as I have already said, require to return to this important subject. It is unnecessary to tell you that in such extensions of the disease as I have just mentioned erratic erysipelas is difficult to conquer. Dr. Peter gives cases in which it passed from the face to the pharynx, and then to the respiratory passages: once established there, in obedience to the tendency of erysipelas to extend, it propagates itself by degrees in such a way as first to produce simple bronchitis, then capillary bronchitis, then broncho-pneumonia, and last of all death.[1]

It has been alleged that when erysipelas begins in the nose and then appears on both sides of the face, it will not extend to the hairy scalp. I have seen cases which might be quoted in support of this opinion; but I have also seen others in which the erysipelas

[1] Peter:—Article "Angines," in the *Dictionnaire Encyclopédique des Sciences Médicales*. T. iv, p. 720.

began in the nose, proceeded to both sides of the face, took possession of the hairy scalp, and made the circuit of the head.

Sometimes the danger of a case of erysipelas is in the essential nature of the disease. There are, for example, cases proceeding from contagion which often terminate fatally, and from their very commencement awake the fears of the physician. There is reason to believe that in these cases erysipelas is only the external manifestation of a primary general affection of formidable character; or it may behave like diphtheria, which, in the first instance local, soon poisons the whole system. At the beginning of 1861, one of my colleagues mentioned to me that several persons living in the same house were suffering from erysipelas, which in some had commenced in the pharynx, and in others at the inner angle of the eyes or external opening of the nostrils. The individual who was first attacked died: the nurse who waited on him died soon after of the same disease; also, several members of the family, and the door-keeper—who had had occasion to come in contact with the deceased—experienced serious attacks. In July of the same year, 1861, the *Gazette des Hôpitaux* published an additional proof of the formidable character of contagious erysipelas, in the history of the death of two of our young hospital pupils, MM. Gaston Reynier and Ernest Gruteau, who were carried off by this disease, contracted in the wards of M. Nélaton and M. Voillemier. Mrs. Reynier, the mother of one of these unfortunate young men, died a few days after her son, from erysipelas caught in her attendance upon him.

Some months after these events, I was called in by my honourable friend Dr. Paris, to consult with him in the case of M. E., upon whom one of our ablest surgeons, Professor Nélaton, had divided the frænum, for the purpose of facilitating the introduction of lithotriptic instruments. M. E. died from gangrenous erysipelas, of which the starting point was the trifling incision made by M. Nélaton in the frænum of the prepuce. On the evening before his death, his wife, who had attended upon him with great solicitude, was seized with rigors: next day, she had violent sore throat, and twenty-four hours afterwards, exceedingly severe erysipelas of the face, which carried her off at a time when she seemed to have entered upon convalescence. The maid of this lady, who had likewise waited assiduously on M. E., took ill along with her mistress. Her attack was specially characterised by violent sore throat, and erysipelas limited to the eyelids. Finally, gentlemen, you remember

to have seen, in June 1862, in bed No. 4 of the St. Bernard ward, a girl of twenty-three, with moderate erysipelas of the face, which had come on during her attendance on her master when he was suffering from phlegmonous erysipelas of the leg.

Spontaneous erysipelas, therefore, though generally a mild disease, is sometimes malignant, fatal, and contagious, as was pointed out by Graves. This malignity may either be inherent in the contagium, or dependent upon a special condition of the recipient.

It is traumatic or surgical erysipelas, specially infectious, which is also so exceedingly contagious. Traumatic cases supply us with some mournful series of facts in proof of the contagious character of erysipelas. Dr. Pujos of Bourdeaux, in a paper, to which the Academy of Medicine awarded a prize in 1866, has reported illustrations of this remark, which, with your permission, I shall now quote in an abridged form.

A sportsman injured his right foot with his gun. The wound, in itself serious, was rendered more so by consecutive hæmorrhage, and became complicated with erysipelas on the fifteenth day. The disease invaded the entire limb, gangrenous patches appeared, and adynamia supervened, which led to death on the twentieth day from the accident. The brother, a healthy young man, who had ministered to deceased during his fatal illness, was seized, without any local cause, with spontaneous erysipelas of the face, which extended to the hairy scalp, and became complicated with adynamic symptoms. He died on the eighth day. The sportsman's daughter, a child of three years of age, had a slight burn on the hand which became the seat of erysipelas. The disease extended to the arm and chest, the symptoms at the same time assuming a formidable character: ultimately, the extent of the disease became limited, and the child recovered. The family laundress, after washing the linen of the household, was seized with phlegmonous inflammation of the hand, from which she recovered. The sick-nurse had erysipelas of the face and head: she had no ataxic symptoms, and recovered. But this history is not yet complete! A sister of charity who had been entrusted with the irrigation of the foot of the wounded sportsman, was forced by fatigue to discontinue her duties: she then felt pains in the right arm, which afterwards became very severe, and were accompanied by nausea, vomiting, and prostration. A large phlegmonous abscess opened in the arm, and was followed by several others in different parts of the body: there was a profuse discharge

of unhealthy pus: sloughs formed: the general symptoms became more and more complicated; and at last the patient sunk under the most excruciating pain. The religious community to which this sister belonged was in excellent health when she returned to it unwell. Upon her return, however, different adynamic maladies, of a more or less severe character, showed themselves in a form at least infectious if not contagious. Health was restored to the community by the sisters evacuating the convent, and going to the country. Prior to this, however, nine sisters who had waited upon, and dressed the abscesses of the diseased, or who had attended upon some of their sick sisters, had severe attacks of illness from which two of them died.

Dr. Pujos also quotes the case of a woman, who died in an adynamic state from spontaneous erysipelas of typhoid type. The physician and two sick-nurses who attended upon her died of erysipelas contracted during their attendance; and a female servant in the family took the disease, but recovered after having been in great danger. Dr. S., successor to M. G., also became ill; but his malady was not erysipelas, and he recovered from it by taking hygienical care of himself.

Allow me to quote some additional cases which occurred in this sadly instructive epidemic. At the hospital of Bourdeaux, Dr. G. observed a man who was admitted for an affection of the eye, and placed near a patient with phlyctenoid erysipelas; and who forthwith took erysipelas in a rather severe form. The starting point was in this case a slight excoriation of the lip: the disease, which was phlyctenoid, accompanied by intense fever, invaded the face and hairy scalp, and then ceased without endangering life. The father of M. G., also a physician, came to attend on his son. On the third day after his arrival, he was seized with sore throat, which was followed by phlyctenoid erysipelas of the face and hairy scalp, accompanied by some general symptoms. He recovered. The sister-in-law of M. G., *senior*, having come to Nantes to see him, fell ill, and passed through a similar illness. She recovered her health, but lost her hair.

Another series of contagious cases commenced with a sailor who had erysipelas of the face around a pimple attributed to the bite of an insect. There was in the first instance erythema: erysipelas then declared itself, which invaded the head, was accompanied by prostration, and speedily ended in death. A woman who had attended

on the sailor, and the woman's husband, were similarly affected, and both died. The captain of the ship to which the deceased sailor belonged also took erysipelas, but soon got well on going to sea.

Erysipelas, as I remarked, is a very dangerous malady, when it is a complication of some other disease, which from its nature, or protracted duration, has already put in hazard the patient's life; when, for example, it occurs in children along with typhoid fever. It is still more dangerous when it supervenes in the course of the adynamic pneumonia of old people, or when it attacks lying-in women and new-born infants.

With reference to what I have already said regarding the epidemic influences which prevailed in 1861, when a terrible epidemic of puerperal fever raged in nearly all the asylums for women in childbed, erysipelas of the face, not generally a dangerous disease, often assumed a bad character, and cruelly contradicted our prognosis. It was also observed that the malady was to a certain extent contagious. One of my medical colleagues has called attention to some such cases, and I have also seen cases of the same description. I met in consultation my honourable colleague M. Higgins in the case of a young American lady, who in the sixth month of nursing was affected with abscess of the mamma. The abscess was opened by M. Nélaton: some days afterwards, erysipelas appeared in the wound, and then extended over the chest. The husband of this lady, an officer of the United States navy, left his ship in the Mediterranean to spend some days with his wife. When travelling by railway, he got an insignificant excoriation of the leg. In less than two days after his arrival in Paris, erysipelas showed itself around the little wound, which soon became a diffuse abscess; and for nearly three weeks his life was in danger.

Excluding exceptional cases, and epidemic influences, erysipelas of the head is not a formidable disease. From 1831 to 1835, a period of four years, during which I acted as the substitute of Professor Récamier in this hospital, I had only one death in 57 cases. The patient who died was admitted with erysipelas of the hairy scalp, complicated with violent delirium: she died two days after admission. An acute disease in which the mortality is less than one in fifty, may certainly be called benignant in its nature; and perhaps you cannot name another which is equally so. For example, compare bronchitis with erysipelas, and you will find—circumstances being the same and the proportion being kept—that the former kills

more than the latter. I am more and more confirmed in this conviction by the cases which I have collected in my private practice, in the practice of my colleagues, and in the different hospital services which I have conducted during the last twenty-eight years. I have no doubt sometimes seen erysipelatous patients die, but I must say that the fatal issue has been much more frequently caused by the treatment than by the disease. The majority of those who died had been subjected to treatment which I look on as most deplorable; and to which I cannot too earnestly call your attention, for the purpose of putting you on your guard against employing it.

When a patient suffering from erysipelas is placed under my care, my rule is to abstain from every kind of treatment. I prescribe a lavement for those who are constipated, and if the constipation continue, I give ten or fifteen grammes of castor oil. This is not very active treatment. You may call it homœopathy if you like! Such, however, has been my plan for twenty-eight years; and, thanks to it, I cannot recollect losing more than three patients from erysipelas during that period. My treatment, then, of erysipelas of the face is *expectant*. I keep my patients in bed, for it is above all things important, both in the acute stage and during convalescence, to prevent them from catching cold, for exposure to cold leads to relapses. I prescribe slightly acidulated diet-drinks: if the bowels are confined I assist nature by giving laxatives, if the vomiting is violent, I combat it by purgatives. But, gentlemen, I give nourishment—I give nourishment even when there is fever—even when there is delirium. So far from prostrating the patient by withdrawing blood, by bleeding him at the arm, or leeching him behind the ear; in place of making it my rule to administer emetics, and give purgatives in repeated doses; instead of placing the patient on very low diet—I remain with folded arms spectator of a contest, from which I know nature will come forth victorious, if I refrain from disturbing her operations. And I again repeat, that of the great number of cases of erysipelas which I have attended, three only have had a fatal termination: the others spontaneously recovered. That is a fact which I ought not to be afraid to proclaim. In erysipelas, as in a certain number of other diseases which pursue a natural course, we physicians require to beware of trying to direct nature when we see the pathological phenomena proceeding regularly, for our ill-timed intervention will only disturb the natural course of the disease, and injure the sick man who has sought our succour.

I think it right to go minutely into these views, because you are entitled to receive from me an explanation of the manner in which I act, or rather abstain from acting, in respect of patients suffering from erysipelas. When you have seen recoveries take place in the practice of other hospital physicians in cases treated on the heroic plan, by bleeding, purging, administration of emetics, application of blisters, cauterization of the affected parts with nitrate of silver—when you have seen recoveries take place *in spite of* that treatment, you may have been apt to believe that they were due to it, and that the remedies employed were sovereign and necessary. But before forming an opinion as to the effects of medical treatment in a disease, it is necessary to be acquainted with its natural history. The primary knowledge, in fact, which the practitioner ought to acquire is acquaintance with the natural history of diseases. In my practice, you observe, I adopt active measures in certain circumstances, and in others allow matters to take their own course, attentively watching the symptoms, however, and ready, if occasion require, to employ the therapeutic resources of medicine. To know when to wait is in our art great knowledge; and prudent waiting explains many successes, particularly those which are sometimes obtained by the sect of Hahnemann.

The erysipelas which seizes a person in the midst of health—not that which supervenes in the course of another disease—is one of the maladies which spontaneously terminate in recovery. This statement of course does not apply to that erysipelas which is only the expression of a special influence acting on the whole system. For example, during epidemics of puerperal fever, lying-in women often sink under erysipelas, but they sink from erysipelas under the same influence which causes other patients of the same class to die of peritonitis or pleurisy—or to express the idea more correctly, of an affection which is merely the expression of a general pathological condition, really the one cause of death. These important questions, gentlemen, I propose to discuss in my clinical course, when an opportunity is afforded of doing so in connection with puerperal fever.

Meanwhile, I have a few words to say on the subject of erysipelas in new-born infants.

ERYSIPELAS OF NEW-BORN INFANTS.

Affection often Puerperal.—Differs Essentially from Ordinary Erysipelas.—Generally Fatal.

In bed No. 21 of our nursery ward, there is an infant, three months old, the subject of congenital syphilis, which, very recently, has been attacked by erysipelas. After spreading over the superior extremities, it reached the base of the chest. In this case, therefore, two diseases were combined, both of which generally prove fatal in very early life. But the erysipelas is already gone, and there seems every prospect of the syphilis being cured. Let me call your attention to the special condition which has probably been the cause of this doubly fortunate result—that condition I believe to be *age*.

The erysipelas of new-born infants is justly regarded as a disease almost as certainly fatal as cerebral fever at a more advanced age. This is a fact which all physicians who have had charge of a children's hospital can verify from their own experience; as I can, after having been twelve years attached to the Necker Hospital. I have found that infants who take erysipelas during the first fifteen or twenty days of life almost invariably die, no treatment being of the least use; but that in those who pass that age, particularly when they get beyond the first month of extra-uterine life, and are thus more removed from their state of fœtal existence—more individualised—erysipelas loses much of its formidable character. To the child of eighteen months or two years, erysipelas is not more serious than to the adult.

Upon what then depends the gravity of the disease in newly-born infants? Does it depend solely on their extreme youth and deficiency of vital power? No! Its formidable character in these subjects arises from quite different causes, which I pointed out long ago, and which have been thoroughly explained by Dr. P. Lorain in one of the most remarkable works which have been published on this subject.[1] Twelve or fifteen years ago, I was struck by observing that during epidemics of puerperal fever at the Maternity Hospital, a great many children were admitted to my nursery wards at the

[1] P. Lorain: Thèse Inaugurale "Sur la Fièvre Puerpérale chez la Femme, le Fœtus, et le Nouveau-né." Paris, 1855.

Necker Hospital with purulent ophthalmia, peritonitis, and erysipelas. I at that time applied the term *puerperal* to all these affections, and in my published lectures stated that all the children in question had the same disease, only that in some it showed itself in forms different from those it assumed in others. I was then of opinion that epidemic puerperal fever presides over the pathology of new-born infants, just as much as it presides over the pathology of recently delivered women. This view hardly transpired beyond the class-room of the Necker Hospital: it did slip into the columns of some medical journals, but it did not at that time obtain general publicity. To Dr. P. Lorain the merit is due of having given it full publicity, and of having demonstrated categorically the truth of the doctrine of which I had caught a glimpse. To him science owes its right to regard this view as the expression of well-observed facts. To enable you to understand this question, upon some parts of which I wish to touch, I require to give you a succinct analysis of the work of Dr. P. Lorain. During the epidemic at the Maternity, where this able and laborious observer was a resident pupil, he collected the information of which the following is a summary.

Of 106 still-born infants, 10 were found to have died from peritonitis, and three of the mothers of these ten infants were carried off by puerperal fever after delivery. Of 193 infants born alive, 50 died of the very same affections which proved fatal to the lying-in women. The most frequent causes of death were peritonitis, numerous abscesses, purulent infection, phlegmonous swellings, erysipelas, gangrene of the limbs, putrid infection, or some other remarkable septic condition. Mother and child often had the same disease, but sometimes its form and seat were, and at other times were not the same in both; for example, a child sometimes died of peritonitis and its mother of purulent infection, or the child of purulent infection and the mother of peritonitis. In 30 cases in which recently born infants died of peritonitis simple, or complicated with erysipelas, meningitis, or numerous abscesses, mother and child were in ten instances carried off by the same affection. The infants of fifty women who recovered after having had puerperal symptoms died of peritonitis.

From these facts, the details of which I recommend you to read in Dr. Lorain's excellent thesis, the author proves that it is the same epidemic influence which affects mothers and their offspring. The existence of this influence cannot be disputed, when we recollect

that new-born infants very seldom die from the lesions I have just named, except during epidemics of puerperal fever.

We cannot deny that there is a bond of pathological community between mother and infant, similar to that which unites the tree's trunk with the branch which proceeds from it. This is admitted in respect of other maladies, such as syphilis and small-pox. Who is unacquainted with cases of individuals presenting at birth the scars of variolous pustules? There is not a year, I may say there is hardly a month, in which I do not point out to you in our wards new-born infants suffering with syphilis engendered by a father or conceived by a mother affected with that disease. In such cases no one denies the existence of the pathological solidarity to which I have referred, and yet it is denied in respect of puerperal fever! In districts where intermittent fevers are endemic, as in Sologne, Bresse, and some parts of Bourbonnais, infants are born with symptoms of marsh cachexia, nothing being wanting to mark this fact, even the hypertrophy of the spleen being found. Without hesitation we admit that these infants when still within their mother's womb have been subjected to the influence of marsh miasmata. It would be easy to multiply similar illustrations; but still there is a disposition to make puerperal fever an exception to the rule; and the opinion so ably maintained by Dr. Lorain has found obstinate opponents. The day will come, however, when the truth which he has demonstrated with so much precision will be generally accepted.

Mother and child then are both subject to the same morbific influence. Let us now inquire, whether there is not a great similarity in the anatomical and physiological conditions of the two organisms which during gestation are one, and which continue to be one, so to speak, for some days after birth. Acquaintance with the physiological, will enable us to understand the pathological analogy. But before proceeding farther, it is indispensable to define what is meant by a new-born child [*enfant nouveau-né*]: and this I do by quoting Dr. Lorrain's definition, which is to the following effect:—

"The infant comes into the world possessed of organs which have ceased to perform, and of other organs which have not as yet performed, their functions. It at once, without any transition, passes from one to another kind of life: it has not, like the young of other animals, a period of repose and physical recruiting, during which the changes requisite for the new kind of existence are accomplished. It has been forcibly thrown into a new medium. The very first

efforts of the organs hitherto in reserve are effective: at the very first moment after birth it breathes, and each succeeding inspiration is performed in the same manner as the first: the first mouthful of liquid swallowed brings into play the organs of digestion: every organ in fact responds to the appeal made to it by the new life, and proves faithful to the Power which created it. But it is not enough for the new-born infant to come into possession of its reserve organs, to make trial of them, to use them for all their purposes, and to live in completeness the new life: it also requires to get rid of the organs by which alone it once lived, but which have now ceased to be of any use. The period during which the new functions are perfected and the old organs disappear is the period of transition or metamorphosis: during it, the umbilical cord separates, and the navel becomes cicatrised: the epidermis cracks and falls off: the hair is renewed: the meconium is expelled: the umbilical artery and umbilical vein are obliterated; and the *foramen ovale* is closed. The "new-born" in fact is the creature in whom this progressive work of separation is going on, and the duration of the period in which it is accomplished is not less than a month."

Let us now return to the consideration of the anatomical and physiological conditions of mother and child. In the mother, after the birth of the fœtus, the placenta is detached from, and expelled by, the uterus. It leaves the surface of the uterus to which it was attached denuded of mucous membrane—the protecting membrane by which it was previously covered. This denuded surface is not only in contact with the external air reaching it by the vaginal orifice, but also with fluids accumulated within the uterine cavity—first of all with blood, and afterwards with pus necessarily formed while the reparative process is being accomplished in the wound caused by the separation of the placenta. This, like all recent wounds, is an open door for the reception of contagia. It undergoes changes analogous to those which often take place in the hospitals of large towns in the solutions of continuity made by the surgeon's knife, and which are liable to become the starting point of general poisoning of the system, like a wound made by a lancet charged with virus.

We find the very same anatomical conditions in the child. In the new-born infant, at the moment of its abrupt separation from its mother, at the moment when the functions of fœtal existence are superseded by those of the new life, we observe that changes take

place which may be compared with those which occur in the organism of the mother. The umbilical cord falls off: having ceased to be of any use, when the placenta which joined the child to the mother was detached from the uterus, it withers up to its point of attachment to that sort of muff formed by the skin of the abdomen, the cutaneous muff which will afterwards be the navel. This is the point at which separation takes place, and this separation is the result of a necessary inflammatory process. Upon the fall of the cord, the umbilicus becomes the seat of a reparatory process analogous to that which takes place in the wound of the uterus. The remains of the cord become detached, and as a necessary consequence of this elimination there is slight suppuration, to which Dr. Lorain has very happily given the name of umbilical lochia [*lochies ombilicales*]. No expression could have been better chosen to express the truth. In the infant, exactly as in the mother, there is a wound: and with Dr. Lorain I say that the umbilicus in the infant is analogous to the uterus in the mother.

The umbilicus and the uterus equally present an open way for the entrance of infection; so that if both mother and infant are placed under the same epidemic influence, it is not surprising that both should contract the same disease, just as happens to hospital patients with open wounds when similarly exposed. And what is it that we see happen to these persons with wounds? Phlebitis, metastatic abscesses, suppurating pleurisy, and erysipelas supervene. Analogous affections occur in lying-in women, with this difference, that peritonitis is the most common lesion in them, as might be expected from the direct effect produced by parturition upon the abdominal serous membrane: for a similar though stronger reason, the uterus and its appendages are still more often than the peritoneum the first parts in which the disease declares itself. In newly delivered women it is the wound of the uterus, and in new-born infants it is the wound of the navel which is the starting point. The pathological analogy is still greater, as I have already said, from the circumstance that the child at birth represents a branch detached from the parent stem, which, for a certain time, seems to live by the life of the tree which produced it: the new-born infant may be compared to "a layer" which cannot grow by itself till it has taken root. The new-born infant like the layer is not at first entirely nourished by its own sap—by blood which till some time has elapsed it cannot have made: it is still nourished by its mother's

blood, it retains all the aptitudes of the maternal organism, from which it is hardly yet separated; and the diseases which it contracts under the same influences as the mother, will assume the same expression as in her.

The erysipelas then of the new-born infant will not be ordinary erysipelas—it will be *puerperal erysipelas*, and possessed therefore of the exceedingly formidable character which belongs to puerperal affections. This formidable character depends less upon the smallness of the vital power of resistance possessed by the subject, than upon the essential nature of the disease. You can now, gentlemen, explain to yourselves the recovery of the child of bed 21 in St. Bernard's ward. It recovered because it had got beyond the first days of extra-uterine existence, because it was three months old, because in fact it had ceased to be a "new-born" infant.

Erysipelas occurring during the first fifteen or twenty days of life is inevitably fatal. It generally begins to show itself at the pubes, and not at the umbilicus: it is characterised by a vivid redness of skin, and a hard, shining appearance of the subjacent cellular tissue. The infant at the same time falls into a state of great prostration: it suffers pain, and gives expression to its sufferings by cries: it has scarcely any fever. If the infant be vigorous, and at the time of its seizure in apparently good health, you will probably regard the affection as of little consequence. What risk is there in an erysipelas extending over not more than three or four centimeters, accompanied by very little febrile excitement and by no disturbance of the functions, the little patient being quite in his usual state of health? In spite of the deceitfully trifling appearance of such a case, you must be prepared for its unfavourable termination; for to-morrow, the erysipelas will have extended to the scrotum or vulva, soon, it will have reached the thighs, and invaded the legs, spread over the other side, ascended to the abdomen and trunk, thus advancing, without fading on the parts first affected. At the end of two or three days, high fever will be set up. The infant will become exceedingly restless, get no sleep, and suffer from gastric symptoms, vomiting, and diarrhœa. He will cry incessantly from pain. A state of restlessness will be succeeded by collapse, which will close the scene on the fifth, sixth, or seventh day. On examining the body after death, pus will be found in the cellular tissue, sometimes suppurative pleurisy, more frequently phlebitis of the umbilical vein or of the vena porta, or peritonitis. Adopting the views of Dr. Lorain

I have long held that these lesions ought to be looked on as the extension of erysipelatous inflammation from the skin to the blood-vessels and internal parts. Erysipelas, phlebitis, peritonitis, &c., are manifestations of one sole disease. In some cases, we see peritonitis in infants, although the erysipelas was on the face and not on the abdomen: and sometimes, on examining bodies after death, we only find indications of the cutaneous inflammation, all the other lesions to which I have directed your attention being absent. Thus you see that the erysipelas of new-born children is an insidious malady. Its formidable character, I cannot too often repeat, depends upon the nature of the cause under the influence of which it is produced, and not on the importance of the local lesion.

I cannot sufficiently impress upon you how easy it is to commit serious errors of prognosis. Some of you may recollect a child of twenty-three days old which took erysipelas, when under the vaccine influence, but in the midst of an epidemic of puerperal fever. This infant was born at the Maternity Hospital, when decimated by that scourge: it was removed to the Hôtel-Dieu on one of the latter days of March 1861, along with its mother, who was suffering from abscess of the mamma. You may remember what I said to those who attended my visit: notwithstanding the appearance of vital power in the little patient, though the health seemed excellent, though the cry was vigorous, and the fever moderate, I announced that death would take place within three or four days. I was mistaken: that very night the child died. In point of fact, the disease generally runs a course infinitely more rapid than the strength of the infant and the character of the symptoms lead one to expect.

To me it has always appeared a strange fact—but it is one of which I have seen examples—that recoveries from this kind of erysipelas sometimes take place when abscesses form in the invaded parts. Within the last two years, I have seen three cases of this kind. I think the only interpretation of these recoveries is, that the progress of the disease to other parts is stopped by its exhausting its violence in one locality. In these cases, the affected part becomes much swollen, and the red colour of the integuments acquires a deeper shade. Lying-in women attacked by puerperal symptoms have also a better chance of recovery, when an abscess forms in the broad ligament or iliac fossa.

In the beginning of 1861, you saw a child, twenty days old,

recover from general erysipelas, after the formation of a deep abscess on the back of the hand. In April of the same year, when an epidemic of puerperal fever, erysipelas, and boils was prevailing in our hospitals, I received into my nursery ward, an infant, twenty-seven days old, suffering from erysipelas. The erysipelas ran over the whole body from head to foot, and even re-invaded the parts which it had occupied and quitted; and yet for more than twenty days the infant resisted death. It had more than ten abscesses, situated on the feet, ankles, elbows, back, and other parts. It died from acute peritonitis. I freely admit that I have great difficulty in explaining why abscesses, which ought *à priori* to be serious complications, should on the contrary prove to be a sort of salutary crisis: but the facts are so striking, that however we interpret them, we must at least admit them.

Gangrene is another common termination of erysipelas in new-born children. It arises quickly. Unlike abscesses, it exercises a very unfavourable influence on the whole economy, and in no form of the disease does death take place so quickly as that in which there is gangrene. This gangrene is dependent upon the puerperal state: it attacks infants under conditions precisely similar to those in which it attacks women with sphacelus of the vulva, vagina, uterus, and in fact of all the parts to which parturition imparts a traumatic condition.

Finally, gentlemen, erysipelas in place of running its usual rapid course, may have a long duration; and in lying-in women we sometimes see the puerperal symptoms proceed so slowly as to lead to hopes which are too often blasted. Sometimes, also, in new-born infants, the attack is prolonged beyond its usual duration, lasting for ten, fifteen, or even for more than twenty days, as you saw in one of our little patients in the nursery, who died on the twenty-third day.

I am not acquainted with any treatment of use in the erysipelas of new-born infants: it is a disease which resists all the efforts of the physician.

It is otherwise, however, with the erysipelas of infants who have passed the first month of life. In them, in all respects, it resembles the disease in adults, and all that we have to take into account is the organization and vital power of the subject. I have often employed a method of treatment in this erysipelas of children, which, in certain cases, has seemed to stop its advance: I refer to the

application to the skin, by a hair pencil, of a solution of camphor and tannin in ether. The lotion ought to be applied both to the parts affected, and to the neighbouring unaffected parts.

You recollect the case of a child, two months old, admitted with its mother to bed 14, St. Bernard's ward. A day or two after birth, this infant had had a small abscess behind the left ear, which left a slight wound. My attention was called to an erysipelatous redness occupying the angle of the left eye, and invading the eyelid, cheek, and nose. Although there was a little fever, the general condition of the child seemed satisfactory. It took the breast as usual, and digestion was accomplished in a regular manner. I employed the other lotions containing camphor and tannin. From the first day on which they were used, the erysipelas did not extend beyond the limits it then occupied; and on the fifth day from the date of admission, the infant, having completely recovered, left the hospital with its mother.

LECTURE XI.

MUMPS.

A Specific and Contagious Disease.—Metastases.—Complications.

You have seen a young man with mumps [*oreillons*] in the last bed in the men's ward. I eagerly seize the opportunity of speaking to you about a disease, of which, most probably, we shall not see another case here for a long time to come.

This young man, six days before his admission into hospital, felt pains at the angle of the lower jaw, first on one side and then on the other. He at the same time perceived that the cheek and neck were much swollen. He had great difficulty in swallowing, and suffered from headache and fever. However, from the evening of the day on which the patient came under our observation the swelling had sensibly diminished. During the course of the disease, metastasis to the testicles occurred. He left the hospital perfectly recovered, and without having had any serious symptoms.

When I ask students who come up to the Medical Faculty for examination, to tell me what mumps is, many reply that it is an affection of the parotid glands which often supervenes during, or at the decline of severe fevers, scarlatina, measles, small-pox, dothienteria, or puerperal fever; thus, confounding the disease upon which I am now going to address you with parotiditis. That, gentlemen, is a great mistake: parotiditis and mumps, even looking to the anatomical lesion only, are essentially different from one another. Parotiditis is an inflammation of the gland and of its cellular tissue: it supervenes during or after severe fevers, is susceptible of passing, and often does pass, into suppuration. But mumps is properly speaking only a simple engorgement [*simple fluxion*] of the gland. This engorgement, as was correctly pointed out by our predecessors, is much more an affection of the inter-glandular cellular

tissue than of the gland itself, and (unlike parotiditis) never terminates in suppuration. Moreover, while parotiditis occurs generally on one side only, both sides are almost invariably affected in mumps, though one is often more affected than the other.

Mumps is a specific disease which, for many reasons, may be classed with eruptive fevers; and this I do, in point of fact, following the example of some authors. Like the eruptive fevers, it is a specific malady, and like them, too, it is very contagious. It usually attacks young persons. Sometimes, however, it is met with in adults, and even in old people. In such cases, the disease can be traced to contagion; and of this Borsieri gives an illustrative case. Indeed it is only in very exceptional cases, that it is propagated otherwise than by contagion. Mumps does not attack the same individual more than once—a fact which is an additional point of resemblance between it and the eruptive fevers.

A malady not severe, and of short duration—*nec diu, nec gravioribus, aut saltem non periculosis symptomatibus, si recte curentur, stipantur, brevique et perfecte resolvuntur*—the mumps, *"les ourles,"* (for so it is still called), is never, except under circumstances which I will point out to you, attended with serious nervous symptoms; and even in these exceptional cases, the life of the patient is seldom in danger. A fact, to which I propose forthwith to call your attention is, that the older the person attacked, so much the more painful is the malady.

Mumps, then, is characterised by a fluxionary engorgement [*engorgement fluxionnaire*] of the parotid glands, and of the salivary glands in general, for the sub-maxillary and lingual glands are often affected. The malady first makes its existence known by a painful bruised feeling which the patient complains of in the parotid region, and a difficulty in mastication, partly caused by pain, and partly dependent upon the disturbance of the salivary secretion, which is sometimes completely in abeyance. Even during convalescence, some patients are obliged constantly to drink when eating, from there being no insalivation of the food. There is more or less swelling of the affected parts: sometimes the swelling extends to the face, so as completely to disfigure the patient: occasionally, it spreads to the tonsils and intra-guttural cellular tissue, producing difficulty of deglutition. There is little change in the colour of the integuments, but it is not unusual for them to be slightly red.

Mumps is a painful disease, and is often at its commencement

accompanied by intense fever, but it subsides rapidly; and at the end of seven or eight days, recovery has taken place spontaneously, and without leaving any traces of the passage of the disorder. But cases occur in which it terminates by metastasis, the parotid swelling disappearing abruptly, to attack in males the testicles, epididymis, and tunica vaginalis, and in females, the breasts or sometimes the labia. As a general rule, when this metastasis takes place, there is only slight constitutional disturbance excited by the new local inflammation resulting from the morbid poison; but it sometimes happens that delitescence of the parotid engorgement takes place without the disease becoming completely fixed elsewhere, when general symptoms of very unusual character show themselves, alarming relations, disconcerting physicians, and causing the latter to adopt treatment which may prove very perilous.

Permit me, gentlemen, to relate two cases in point which I have seen. In 1832, I attended a man, about thirty-five years of age, suffering from mumps. The symptoms were following their regular course, the pain had diminished, and the swelling in the parotid region was beginning to decrease. I had seen the patient in the morning, when he seemed quite as well as I had any right to expect; but in the evening, I was hurriedly sent for. I found him with a countenance of inexpressible anxiety; with face, pale and pinched; with pulse, small, rapid, and unequal; and the extremities cold. He had neither vomiting nor diarrhœa, nor any appreciable lesion of lungs or heart. I proceeded in accordance with the indications, giving ether and warm aromatic drinks, and moving sinapisms over the surface of the body. Meanwhile, I anxiously waited for the issue of an attack which had set in under such unfavourable auspices. Next morning, to my agreeable surprise, the patient had smart fever, a full pulse, and a moist skin. There was colour in the face, and a lively expression of countenance. But there was swelling of the scrotum, and one of the testicles, particularly the epididymis, was swollen and painful: in fact, there were all the characteristic symptoms of the most acute form of swelled testicle. I recalled to my recollection cases reported by Borsieri, and Morton's *febris testicularis:* I felt reassured. I respected the local manifestation, which had been the means of relieving the economy from a threatening state. A few days sufficed to accomplish the cure of the metastatic complication, and to restore the patient to perfect health. This case made a deep impression upon me, for it occurred when I was

young, and at the age when one forgets nothing. I resolved at the time, in the event of a similar case presenting itself to my observation, to place the two together. Twenty years elapsed before this opportunity was afforded me.

In 1853, I was summoned by my honourable friend Dr. Moynier, to meet him in consultation in the case of a student, seventeen years of age, about whom there was very great anxiety. This young man, when in the midst of apparently good health, (according to the statement, at least, of his parents and the principal of his educational institution), was seized with burning fever, extreme frequency of pulse, desponding tendencies, delirium, picking of the bed-clothes, vomiting, and the involuntary passing of serous stools: the symptoms resembled those of the bad days of the third week of putrid fever, or the onset of those attacks of malignant scarlatina which prove fatal in a few hours.

You can understand the dismay of the family and of the physician in presence of these symptoms. Dr. Andral had seen the patient from the commencement of the illness, and like Dr. Moynier had perceived the danger without being able to recognise its cause. Both were of opinion that the primary indication was to sustain the powers of life; and consequently, opium in small doses, sulphate of quinine in pretty full doses, and slightly cordial drinks were judiciously prescribed. On the following morning, when I met my two colleagues, the condition of the patient continued very much the same, but perhaps was not quite so bad. We were told of a slight complication which had arisen during the night—swelling of the scrotum, and a swollen painful state of one of the testicles. This was the only organic lesion in any respect noteworthy, and it certainly was not of a nature to explain the terrible train of symptoms before us. All at once, the history of my first patient flashed across me, and I related it to my colleagues. I ventured to give a somewhat less unfavourable prognosis, believing the affection to be matastasis of mumps. It was, however, incumbent on me to yield to the precise statement of symptoms laid before me, and the treatment of the preceding evening was, therefore, continued. Next day, there was much less swelling of the testicle and epididymis, the delirium, vomiting, and diarrhœa had ceased: there was still smart fever, but the pulse had more volume, and the skin was moist. In a few days, the young man was restored to his family, and to health.

We now questioned him minutely. He told us that two or three

days prior to the beginning of his illness, he had experienced a feeling of general discomfort, with pain in the throat, and swelling near the ear and at the angle of the lower jaw; and that he had caught cold in an excursion to the forest of St. Germain. He stated that the swelling diminished next day, and that it was on the following day that the alarming symptoms appeared.

About the date at which this case occurred, mumps were prevailing in a boys' boarding-school to which I was physician. I informed the principal that the malady was not of a serious character, but I also stated that metastasis to the testicle was a possible occurrence, so that in the event of any of the elder boys being affected in this way, he might not suspect the cause to be gonorrhœa. Some days afterwards, on visiting the infirmary of this school, I found one of these metastatic cases.

Mumps was also at that time prevailing in young ladies' boarding-schools, and I met with cases of metastasis in those institutions. As I have already said, the metastasis in women is generally to the mammæ. It is a remarkable circumstance that no case of metastasis of mumps to the ovaries has been recorded. As these organs are considered the analogues of the testicles, it might be supposed that they were specially the seat of the metastatic engorgements of which I am speaking.

In some families, there is a peculiar tendency to this metastasis. Dr. Poinsett told me that he and his two brothers had violent orchitis after mumps.

The two cases, the particulars of which I have now detailed, are exceedingly curious, not in respect of the mere metastasis itself, for that is a fact pointed out by all authors, but on account of the symptoms during the accomplishment of the metastas is, before it was established.

Many physicians, especially since the doctrine of the localization of disease has taken so sadly important a place in medical education—a place which, thank heaven! it is daily tending to lose—many physicians, I say, have denied metastasis, to the extent at least of holding that the symptomatic phenomena do not show themselves until the new lesion is developed. The hippocratic physicians believe that the morbid poison is afloat in the economy, that it comes in contact with all the organic elements, producing a variable amount of general disturbance precisely similar to what is seen during the period of invasion in eruptive fevers, when terrible

symptoms occur prior to the existence of any lesion of the solids, ceasing or decreasing as the local lesions show themselves. This is a question involving important clinical facts; and as it is only from such facts that we can derive a useful acquaintance with it, my duty is to bring them under your notice.

The kind of metastasis now being considered by us proves the existence of a sympathy between the parotid gland and the genital organs: the existence of this sympathy is matter of common observation, but its manifestation in an inverse order—that is to say proceeding from the genitals to the parotid—is a less familiar fact. A case of this kind, however, was observed by Dr. Peter when he was Professor Gerdy's *interne*. On May 1st, 1855, a woman, twenty-two years of age, was admitted to La Charité Hospital. She had all the signs of violent inflammatory congestion of the right parotid region: there was swelling and pain, but neither redness nor fluctuation. The patient had anorexia and a little fever. The malady had commenced, four days previously, with great difficulty of moving the lower jaw: an hour after this symptom was experienced, swelling supervened, and this was followed by pain. But the point of interest in this case was the statement of the patient, that many times before she had had a similar affection, always, however, at the menstrual periods, and in substitution for the menstrual discharge. Her menstruation was irregular, and several times, for months in succession, she had been without her courses: she then suffered from headache, and swelling in the parotid region, (generally on the left side), which was sometimes attended with loss of consciousness for an hour. On each occasion recovery took place quickly, after the application of leeches and cataplasms. That is not all: the patient stated that even more frequently than the affection of the parotid glands, and always at menstrual periods, when the discharge was scanty, she had had a sort of thrombus of the left nympha, accompanied by acute pain and inability to walk. The symptoms continued for four or five days, and then terminated in slight hæmorrhage from the nympha. The patient left the hospital on the 5th May, and was re-admitted to the same wards on the 1st September, at a date which exactly corresponded with her catamenial period. On this occasion, there was again the same inflammatory engorgement on the left side. She stated that in June she had had parotiditis; in July, a thrombus occupying the left labium and nympha, followed by considerable hæmorrhage; in August, paroti-

ditis; and in September, she returned to the hospital with a repetition of the latter affection. Finally, on the 2nd November, Dr. Peter saw her in the out-patient's room, with true thrombus of the left labium and nympha. She did not then wish to come in to the hospital.

Gentlemen, it is difficult not to see in this case the reciprocity of classical facts. Just as metastasis to the genital organs may take place in mumps, so was there, in Dr. Peter's case, a metastasis to the parotid glands of an abortive catamenial congestion.

Mark well, that in quoting this interesting case, I have not been discussing mumps: in this case, the affection was parotiditis, or at least inflammatory congestion of the parotid gland. But mumps as I have told you is a specific affection, analogous to the eruptive fevers, like them contagious, and like them not attacking the same subjects more than once. I have therefore quoted Dr. Peter's case only as an additional and curious example of a kind of sympathy which is still unexplained.

LECTURE XII.

URTICARIA.[1]

A Distinct Nosological Species.—Sudoral Nettlerash [l'éruption ortiée sudorale] is no more Urticaria than Morbilliform and Scarlatiniform Sudoral Eruptions are Measles and Scarlatina.—General Precursory Symptoms.—Exciting Causes.

Gentlemen:—An officer of about thirty years of age, of good constitution, was seized, in the midst of perfect health, with symptoms which at first presented an alarming character: the symptoms to which I refer were precordial oppression, intense headache, nausea, and high fever. They had set in during the evening, had continued all night, and had scarcely moderated when the physician arrived. At this time, the face was considerably swollen, and the swelling occasioned a very disagreeable feeling of tension of the skin; swelling in a less degree was observed over the whole surface of the body. The skin was covered with an eruption characterised by whitish blotches [*élevures*] surrounded by a slightly red areola. The general symptoms rapidly disappeared, the patient complained only of insupportable itching, and had completely recovered within thirty-six hours from the commencement of the illness. Some time afterwards he had a return of the same malady, the symptoms being similar to those of the first attack. A similar eruption appeared on the skin, and it disappeared with similar rapidity, possibly under the influence of a mild laxative, which was administered on both occasions. This gentleman could not attribute either attack to any food he had taken. He only recollected that he had eaten a bit of sole on the evening before the first seizure, but he also remembered that it was

[1] Fièvre Ortiée: Febris Urticata of Vogel.

perfectly fresh; and moreover, till then, he had always eaten with impunity the various articles which often in others occasion urticaria, such as mussels, various other descriptions of shell fish, and crabs.

Urticaria was the affection from which the officer suffered; and in the very succinct account I have now given of it, you have recognised the description of the special form of exanthem, the absolute type of which is the eruption caused by the touch of the stinging nettle.

I pointed out to you the other day nettlerash [*l'éruption ortiée*] occurring as a sudoral exanthem, but that eruption does not constitute the malady now under our consideration any more than morbilliform and scarlatiniform sudaminal exanthemata constitute measles and scarlatina.

Urticaria, the *febris urticata*, is a well-defined nosological species, although it originates under the influence of exceedingly various causes. These causes, however, only play a secondary part. They are the exciting causes [*causes occasionelles*] waking up according to the idiosyncrasies of individuals a special predisposition, in virtue of which the morbific matter is formed, which is the real, or as the old writers would have called it, the immediate cause of the disease.

Urticaria makes its presence known, like the eruptive fevers, by precursory symptoms, which continue, with variable degrees of intensity, for some hours, a day, or two days. These symptoms are general discomfort, headache, horripilation, rigors, precordial oppression, lipothymia, and more or less difficulty in breathing, which is sometimes so great as to excite the fear that the patient will be suffocated. In some cases, nausea and vomiting occur; and there are also some cases in which there are colic, diarrhœa, and all the symptoms of indigestion, but this is when the exciting cause is the eating some particular kind of food. The symptoms are always accompanied by a well-marked febrile condition. It seems as if the morbific matter were formed in such quantity that the different emunctories are scarcely sufficient to eliminate it, or that before finding its natural exit, which is by the skin, it goes round—pardon the figure—knocking at every door, thus affecting the nervous system, the organs of respiration, and the organs of digestion.

The patient soon begins to feel an unusual sensation of heat and itching at particular points in the skin, which forthwith become

swollen. This swelling, quite appreciable by the eye, becomes generalised over a more or less extensive surface, occasions a feeling of tension complained of by the patient; and finally, the characteristic eruption appears.

The eruption which now occupies the face, and bye and bye other parts of the body—particularly the shoulders, loins, inner aspect of fore-arms, thighs, circumference of the knees—consists of blotches which are of a rosy or bright-red, and sometimes dull-white colour, always surrounded by a red areola, and exactly resembling in form, extent, and general appearance the eruption produced by the stinging of nettles, and sometimes by the stings of bees and wasps :—"*Forma, magnitudine et specie valde similes illis quas urticarum punctura, aut vesparum apumve ictus excitat.*"

The number of the blotches is variable: sometimes they are very few and quite distinct from each other; at other times they cover nearly the whole body, and become confluent. There is nothing determinate in their shape, which may be round, oval, or irregular. When numerous and confluent, they may resemble the eruption of scarlatina; and the rapidity with which they come out, combined with the short duration of the precursory symptoms, increases the chance of a mistake in diagnosis, if sufficient elements for arriving at a correct opinion are not furnished by the tumefaction of the skin (sometimes great), the pruritus and tingling, and an attentive examination of the blotches. The pruritus and tingling, which give great annoyance to the patient, are increased by the warmth of bed.

I have still to call your attention to a circumstance connected with the eruption which was pointed out by Koch, viz. that it may become developed on the inside of the mouth. This observation leads me to ask, whether the chest symptoms of which I have spoken, are not occasioned by an eruption or congestive state of the mucous membrane of the bronchial tubes analogous to the eruption and congestion seen on the skin. My opinion is that bronchial eruption may occur in urticaria, precisely as in measles.

In the pyrexial exanthemata, the cutaneous manifestations occur in regular order, and follow a definite course, but in urticarious fever [*fièvre ortiée*] this is not the case. The total duration of the disease, including the prodromic period, is very variable, ranging between two and seven or eight days; but the individual blotches of eruption disappear very quickly, their duration being from four,

five, or six minutes to one, two, or three hours. The eruption, then, does not come out all at once, but in successive crops; and the precursory symptoms which announced the first appearance of eruption may recur again and again. Sometimes scratching causes the eruption to reappear in the places scratched.

Urticaria spares neither age nor sex: it attacks old men, adults, and children; and women as well as men. A first attack, so far from being protection against a second, is a reason for expecting subsequent attacks, especially in those in whom it supervenes under the influence of exciting causes. In fact, some individuals cannot eat certain descriptions of food without bringing on symptoms of indigestion, or rather of true poisoning, soon accompanied by a more or less considerable urticarious eruption. It is impossible to state in general terms the kinds of food which produce these symptoms, because so much depends upon idiosyncrasy. Shell-fish, particularly mussels, crab, lobster, the ova of certain fish, and some kinds of fish (fresh or smoked) seem to be the articles of diet which are most powerful in exciting urticaria in some persons; whereas in other persons, similar results are caused by dietetic articles of a totally different description, such as pork, edible mushrooms, almonds, cucumbers, strawberries, raspberries, honey, &c. Lorry gives cases in which eating rice produced urticarious eruption.

A predisposition to urticaria is sometimes hereditary. In October 1861, I saw in my consulting-room, a lady of fifty, who was very subject to anomalous nervous symptoms, and who had been a martyr to urticaria during the greater part of her life. She had a son and daughter who had inherited from her this distressing infirmity, which was as inveterate in them, as it had proved in their mother.

Although urticaria is apparently a simple affection, it assumes in some persons an extraordinarily obstinate character, and becomes a real torment of existence. I have seen it last for years, renewing itself daily, and defying all treatment.

Sometimes also, urticaria has a terrible influence upon the nervous system. I knew a young woman of twenty, who during the invasion-period of an urticarious fever was seized with nervous symptoms of the most formidable character. She was struck down by profound stupor, paralysis of the lower extremities, and anæsthesia. In some cases, fortunately very rare, after the eruption has entirely disappeared, nervous symptoms—anæsthesia and amyosthenia, par-

ticularly of the lower extremities, continue for a longer or shorter period.

The hot weather of summer is often an exciting cause of urticaria: but, as has been remarked by J. Franc, it likewise sometimes appears under the influence of cold, and disappears under the influence of heat.

Finally, it is also sometimes absolutely impossible to assign any cause whatever for the appearance of this disease.

I will not speak to you, gentlemen, of chronic urticaria, or of *urticaria tuberosa*. They are forms of the disease which I have never had an opportunity of observing in the clinical wards; but my colleagues of St. Louis Hospital will show them to you, and make you acquainted with them.

I have still a word to add on the subject of *treatment*. When urticaria occurs without any appreciable exciting cause, it is seldom necessary for art to interfere, as the malady spontaneously terminates in recovery. However, at the beginning of the attack, the administration of mild purgatives is sometimes indicated, with a view to divert a tendency to congestion from the respiratory organs to the intestinal canal. To moderate the symptoms, it is generally sufficient to order tepid baths, and cooling acidulated drinks such as orangeade and lemonade.

But when urticaria is excited by the ingestion of alimentary substances, it is necessary, without loss of time, to induce vomiting. After the action of the emetic, draughts containing ether may be prescribed—for example, a quarter of a tumbler of sugared water, containing from twenty to forty drops of sulphuric ether, may be taken every half hour. Ether is also indicated, when you wish to subdue spasmodic action.

When urticaria assumes a chronic form, it sometimes resists the best devised modes of treatment. Some benefit, however, is obtained from frequent emetics, the preparations of quinine in large doses, and arsenical solutions.

When urticaria appears as a natural crisis of a chronic affection of the mucous membranes, you must not interfere with it. Sometime during the year 1860, I saw in consultation with my honourable colleague Alfred Becquerel, a lady of sixty, who had been attacked in the spring with violent bronchitis. Soon after her seizure, symptoms of extensive vesicular emphysema supervened, accompanied by nocturnal attacks of orthopnœa, and constant

dyspnœa. It would be tedious to tell you all the therapeutic means I had recourse to. Suffice it to say, that they had all failed, when, about the end of January 1861, a violent coriza led us to dread an exacerbation of her symptoms, but on the contrary, a profuse urticarious eruption having appeared over the whole body, they all at once ceased. I felt that under the circumstances, I ought not to interfere with an eruption, which though undoubtedly very inconvenient and very obstinate is not dangerous.

LECTURE XIII.

ZONA OR HERPES ZOSTER.

Characteristics.—Accompanying Pains.—Invetcrate Consecutive Neuralgic Affections.

Gentlemen:—You recollect a man of 55 years of age, who occupied bed No. 10 in St. Agnes's ward in April, 1859. Three days prior to admission, this individual was seized wtth acute pain behind the left ear. On the following day, there was a temporary cessation of pain; but on that day and the following, he perceived an eruption consisting of groups of blebs. These groups increased in number, and when the case came under my notice, occupied the situations which I am now going to describe.

The eruption extended from the ear to the front of the chest: it was most abundant on the left shoulder and arm, within the triangle formed by the sterno-cleido-mastoid muscle the trapezius and clavicle. Over the pectoralis major muscle, about two centimeters below the clavicle, there was a group extending nearly five centimeters. Behind the ear, over the mastoid process, we found the first which appeared; and between it and the other large group, in the space which I have described, there were other smaller groups. Some were also situated on the external aspect of the shoulder, and three on its posterior aspect. These groups were formed by blebs not yet completely developed, and the patient, who complained of their being painful, traced with his finger the course of different branches of the cervical plexus.

He had a good appetite, no fever, and, as he expressed it, was in no way out of sorts.

On the second day after admission, the eruption was perfectly bullous. The blebs desiccated in succession forty-eight hours after-

wards, and the desiccation was complete on the sixth day, consequently, on the ninth day from the beginning of the disease. The neuralgic pains became less severe; and on the twenty-second day, the patient was quite well, and left the hospital. There were only visible some red spots where the blebs had been.

Some months afterwards, another case of herpes zoster came under our observation.

The patient was a man, thirty-eight years of age, employed as a servant in the wards. He had been aware of the existence of the affection for two days; but it occasioned no pain, and only some itching. Till the third day, which was the first day on which he had pain, he did not mention his ailments to me. The eruption began to the right of the tenth vertebra and extended from the vertebral column to the sternum: it consisted of four groups of vesicles of about the diameter of a small walnut, resting on a red surface. The pains were sufficiently acute to prevent the patient sleeping; but he had neither fever nor rigors, and complained of only a little general discomfort. On inquiring into the seat of the pain, we were struck by finding that it did not exist in the course of the zona, and was not excited even by pressure on the affected parts, though felt above and below them. The pain was acute, and was aggravated by the slightest pressure. On the eighth day, the patches of herpes zoster changed into very painful furuncular tumours; and soon afterwards, we found an engorged lymphatic gland in the intercostal space below them, and also, red lines leading from the eruption to the axilla, indicating inflammation of the lymphatics with its starting point in the furuncular tumours. These circumstances explained why the patient experienced pain beyond the seat of the eruption.

At the beginning of the year 1863, another man acting as servant in the wards, was attacked with herpes zoster of the face, which I showed to Dr. Cusco, my honorable colleague in the hospitals. It was situated on the left side of the forehead. The eruption followed with remarkable anatomical regularity all the cutaneous ramifications of the ophthalmic branch of the fifth pair. It was most confluent in the parts where the external frontal branch spreads out into ascending ramifications; it likewise extended to the eyelids, where the divisions of the descending branches are distributed, and became more violent at the point of emergence of the branch of the nasal nerve which is distributed to the integuments of the lobe of the

nose. The neuralgie pains were very aeute, and eontinued long after the disappearance of the exanthem. There was also ophthalmia, aecompanied by pain and photophobia.

In 1862, I had previously seen, along with my honorable colleague Dr. Delpech, a man aged sixty with herpes zoster exaetly similar to that now deseribed. The photophobia eontinued for more than three months, and was associated with iritis.

The very remarkable tendeney whieh herpes zoster sometimes has to follow the course of the nerves is fully established by the cases which I have now related to you. You must not suppose, however, that the eruption always assumes the form whieh I have described. If you attentively look at its distribution on the chest in relation to the direetion of the ribs, you will be eonvineed that it does not follow the eourse of the intereostal nerves. Generally, on the chest, the half girdle formed by the eruption is almost exaetly perpendicular to the axis of the body, beginning, for example, at the seventh dorsal vertebra, and terminating direetly opposite, at the sternum; but the ribs and intercostal nerves are very far from following a line perpendieular to the axis of the body. Portions of the vertebral eolumn, and the ribs below the fifth rib, slope very much downwards, and form an angle of more than twenty-five degrees with the spine: theoretically, the zona ought to follow the same direetion, but it does not do so, as you know from cases you have seen in the wards. It is evident, therefore, that it is not an absolute, though a general, rule that the bullous eruption of herpes zoster follows the course of the nerves.

When the eruption appears on the legs, it does not eneirele them like a braeelet or garter, but extends in the length of the limb. You recolleet a man who oeeupied bed No. 8 of our St. Agnes's ward, in whom it was situated on the thighs and extended from the groin to the knee. In August, 1862, I saw in my consulting-room a patient in whom the eruption extended from the hollow of the axilla down to the hand, keeping rather to the palmar aspect of the forearm. In the patient of St. Agnes's ward, the herpetie patehes were distributed exactly in the course of the prineipal divisions of the erural nerve, while in the other patient, it was very diffieult to find any relation between their distribution and the course of the branehes of the brachial plexus: in both patients, however, there were aeute neuralgic pains in the part of the limb oecupied by the eruption.

Here then, gentlemen, is a singular disease, the speeifie nature

of which no one can tell. The eruption by which it is characterised consists of patches, individually variable in size, of a bright red erythematous colour, and having vesicles grouped upon them—or, more correctly, bullæ, forming sometimes real blisters, more or less numerous and more or less large. These patches, separated from one another by healthy skin, form, when taken collectively, a sort of half girdle, a sort of zone, which has given the name of *zona* to the disease, and which is nearly always limited to half of the body, whether the eruption occupy the trunk or the face. On the thorax, its usual seat, the zone never passes beyond the middle of the sternum: on the abdomen, it stops at the linea alba, and behind, it never crosses the vertebral column. "*Perpetua lege*," said de Haen, "*ab anteriore parte abdominis nunquam lineam albam, nunquam a postica spinam* (*maculæ*) *transcendunt*." The chest is the most usual situation of the eruption, but it is also seen on the abdomen, where it encircles the lumbar or iliac region, proceeding thence to the groin, and terminating on the anterior surface of the thigh, sometimes also invading the genital organs. When the zone occupies the thorax, it generally also invades the arm of the same side, presenting patches in continuation of the line of the girdle, either inside or outside of it, or both. In the first of our patients, the eruption was situated on the neck, shoulder, and upper part of the chest and back. Sometimes, it remains limited to the first of these regions: sometimes also, it is confined to the face; and in exceptional cases, it appears on the hairy scalp. It has been seen to extend within the mouth. Finally, in a still smaller number of cases, the limbs only are invaded. In all cases, however, there is only one side of the body affected. It is also important to recollect, that when herpes zoster affects the extremities, the groups of eruption, whether they follow or not the course of the superficial nerves, are always, as I have already said, disposed longitudinally, and not round the limb.

The half girdle is sharply defined at both ends, and has a breadth of several fingers. The groups which compose it are sometimes rather close to each other, and at other times, rather distant. The eruption begins by the appearance of the red irregular spots of which I have spoken, and which come out the one after the other, showing themselves in such a way in some cases, at the two extremities of the line, as to indicate that the succession of eruptions is just about to be completed. The patches at the extremities of the line are larger

than those which intervene. Cazenave, from whom I have taken my description of the disease, says that "if its progress be attentively observed, small elevations will be seen which have from the first the hue of the patch, and which increase in size and rapidly become true vesicles, quite distinct from one another, very transparent and resembling little pearls in colour. The development of the eruption is completed in three or four days. The largest vesicles are seldom larger than a large pea. When the eruption has attained its maximum intensity, the patch which constituted its base presents great redness, which generally extends one or two centimeters beyond the limits of the vesicular group. Each patch, therefore, has its phases of increase, and patches are developed one after another in the same way, till all constituting the demi-zone have been formed."

Cazenave continues: "At the end of five or six days, the vesicles begin to diminish in size, and the liquid which they contain becomes muddy, opake, and sometimes blackish, as if it were sanguinolent: the vesicles become wrinkled, withered, collapsed, and are soon covered with small, thin, brown crusts which fall off in a few days. Every group undergoes similar changes, and about the tenth or twelfth day from the beginning of the disease the eruption has run its course. Nothing then remains except a few red stains, which gradually disappear. Nevertheless, it sometimes happens, even in the simplest cases, that in scratching the parts, the patient tears the vesicles, causing them to be succeeded by excoriations and sometimes by small ulcerations, which often greatly prolong the duration of the malady. This complication generally occurs at the base of the chest."

The mode of succession described by Cazenave is more apparent than real. I concur with the statement that the herpetic groups do not all appear on the same day; but in general, by the third, or at most by the fourth day the eruption is complete. After that period, the vesicles enlarge, and unite to form large bullæ, which forthwith become filled with transparent serosity around which the skin has a violet-red colour, and seems to yield a slightly slate-coloured exudation. Between the eighth and eleventh days, the bullæ become filled with pus, and go on bursting in succession till the fourteenth day, dating from the commencement of the malady. A great many vesicles, however, remain on the road, if I may be allowed the expression, and disappear prematurely, or at least without having become filled with pus. Those which have reached the stage of

suppuration burst, as I have stated, and the denuded dermis becomes covered with a blackish crust which comes off between the fifteenth and twentieth days, when the dermis, at first of a purple-red hue, by degrees loses its deep colour, until at the end of two, three, or four months, there is nothing visible excepting a white cicatrix similar to that left by a very superficial burn.

It is a remarkable fact to which, gentlemen, I bespeak your special attention, that generally (though not always, as some have alleged) the eruption is developed in the track of the nervous filaments of which it delineates the course: thus, on the thorax, it may follow the course of the intercostal nerves, and in our first case, you saw how it delineated, so to speak, the ascending and descending branches of the cervical plexus. This circumstance is more than a mere descriptive detail: this disposition of the eruption is related to another phenomenon, which, independent of the form of the disease, is a precise and definite characteristic of herpes zoster. This characteristic is the local pain, which almost always precedes and accompanies the eruption, and often continues long after its disappearance. I am not at present speaking of the prodromic symptoms, the slight discomfort and feverishness which, either nearly or altogether, cease when the eruption has completely come out: I refer to the neuralgic pain in the future seat of the zona, the true, acute, pungent neuralgic pain—a sensation of roasting, of burning heat, a symptom from which the disease derived its old names *ignis sacer*, *feu sacré*, and *feu de Saint-Antoine*. These pains accompany the eruption, and I pointed out to you in our first patient, that they exactly followed the course of the articular and subacromial branches of the cervical plexus, and were increased by pressure on these parts just as pressure increases the pain of ordinary neuralgia. There are exceptions, gentlemen, to this rule, and the case of our second patient is one of these exceptions. This individual had no prodromic phenomena, and none of the usual neuralgic pains. The pains which he did complain of on the third day of the eruption were situated beyond, that is to say above and below the eruption which it circumscribed, and were not neuralgic, but dependent upon inflammation of the lymphatic vessels.

At the beginning of March 1861, I was sent for in haste to a lady of sixty-three, who, with the exception of some attacks of gout, had generally enjoyed good health. She had excruciating pain in the left lumbar region, which caused her to utter piercing cries, and although she had no vomiting, her gouty constitution led me to

suppose that she was suffering from the passing of renal calculi. Next morning, when the pains were a little subdued, I observed an herpetic eruption occupying the surface over the place which had been the seat of such exquisite suffering, and I was thereby immediately enlightened as to the nature of the malady. In forty hours from the onset of the attack, the eruption was complete, extending from the spine to the linea alba.

The persistence of the neuralgic pain after the disappearance of the eruption is, particularly in old people, one of the most remarkable characteristics of herpes zoster. The pain, which always possesses the same acute character, which always produces the same intolerable sufferings, often continues, not merely for months, when the marks of the bullæ are still on the skin, but may even continue for several years. I knew an old lady who had herpes zoster when seventy years of age, and who after the lapse of fourteen years still experienced most excruciating pains, particularly during the night. I have at present under treatment a lady of sixty who for the last five years has been horribly tormented by the pains which belong to this disease. There is a curious circumstance in the case of this lady, which I have observed in several other cases: the mere contact of her clothes sometimes produces indescribable suffering, although superficially there is a sort of cutaneous insensibility, which continues long after the pains leave her.

I am not quite sure that herpes zoster is not sometimes contagious like erysipelas of the face. On the 20th August 1862, I was sent for by Dr. Brossard to see with him an old Jewish lady living in rue Montmorency. She was suffering from softening of the brain. Six weeks before our visit she had had very painful zona on one side of the chest. Her son, aged thirty, who waited on her, took the disease at the commencement of his mother's convalescence.

Although the prognosis of this disease is not unfavorable, seeing that it does not endanger life, it is unfavourable in one sense, for it leaves many persons, old people at least, martyrs to those intolerable pains which make both patients and physicians despair of a cure.

The pain, and its persistence after the disappearance of the eruption, long ago engaged the attention of observers. Lorry in his treatise "*De morbis cutaneis*," and, about the same time, Geoffroy, and Borsieri pointed out and insisted upon this circumstance. It

did not escape the notice of Alibert, Rayer,[1] and many others; and more recently Dr. J. Parrot has ably discussed the subject of zona and of the pain, one of its predominating symptoms, which pain he classes, as I do, along with neuralgic affections.[2]

Dr. Bazin, my distinguished colleague of the St. Louis Hospital, has found it necessary to distinguish two kinds of zona—one arthritic and of the nature of rheumatism, and the other herpetic. Arthritic zona may often originate in moist cold, and in changes of temperature. It occurs most frequently in adults, and almost never in old people. The disease when met with in infancy is arthritic in the vast majority of cases. Herpetic zona, on the other hand, is most common in old age. It is often brought on by mental emotions, and is accompanied by jaundice in a certain number of cases. Its vesicles are pretty equal in size, and grouped in a regular manner. The bullæ which I have described to you are, on the contrary, most frequently met with in the arthritic form. Herpetic zona is often preceded, and is generally accompanied by, neuralgic pains. These pains sometimes decrease in severity during the eruption, to return as before with the eruption: they are then only a secondary symptom. Dr. Bazin says that the neuralgic pains have been known to continue for months and years, to follow an intermittent course, and at last to be replaced by other neuralgic pains in situations different from those which were in the first instance the seat of the neuralgia. Finally, herpetic zona generally has as antecedents, hemicrania, dyspepsia, and other herpetic affections. In relation to these doctrines, recollect the persistence of pains following zona in the aged patients of whose cases I have just been speaking.

To prevent the vesicles from being torn, the only means which require to be employed during the acute stage are powdering the affected parts with starch, and during the latter days, bathing them. Some have recommended cauterization with the nitrate of silver, but the expected beneficial results have never been obtained from this treatment. For the pains subsequent to the eruption, it is useful to employ frictions with the mixture of belladonna, or a solution of atropine or of morphia: subcutaneous injections with the same solutions may also be advantageously resorted to. Flying

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[1] Rayer:—Traité Théorique et Pratique des Maladies de la Peau. Paris: 1835, T. i, p. 330.

[2] J. Parrot:—Union Médicale, Mars, 1856.

blisters and vapour douches have also been employed. Often, however, every kind of treatment fails; and I know patients, chiefly women, who have for years been tortured by these neuralgic pains. Acquaintance with the nature of herpetic zona led Dr. Bazin to adopt a rational method of treatment. He gave arsenical preparations with success in the obstinate neuralgia consecutive to zoster; and so accomplished cures in cases which had resisted narcotics, narcotico-acrids, and cauterization. His method of treatment ought to be imitated.

LECTURE XIV.

SUDORAL EXANTHEMATA.

Multiplicity of Forms.—Cutaneous and Mucous Exanthemata.—Physiological Causes.—Antagonism of the Secretions with the Skin and the Intestinal, Respiratory, and Urinary Mucous Membranes.—Exanthemata produced by Medicinal Agents.—Sudoral Exanthemata becoming Purulent in Lying-in Women and others.—Analogies between Sudoral Exanthemata and Exanthemata Produced by a Virus, or Dependent on Diathesis.

Gentlemen:—During the hot season, you have often observed the spontaneous development of cutaneous eruptions in a great many patients. These eruptions are concurrent with profuse perspirations, and are most abundant in those parts of the body which are most constantly bathed in sweat. You have observed them most frequently in the children of our nursery-ward, that is to say in children under two years of age. The greater frequency of these affections in very young children arises from the manner in which they are clad—on the swaddles and flannel binders in which they are always enveloped, and by which they are kept in a state of continual sweating. You have been struck by the multiplicity of forms which these efflorescences assume—you have seen them as erythematous, scarlatiniform, and morbilliform patches, as urticaria, or as vesicular, pustular, and papular eruptions. You could not fail to be struck with the rapidity of their development, and the generality of their localization; nor could you but be surprised at their short duration, some disappearing with marvellous ease, either spontaneously, or under the influence of very mild treatment. Finally, gentlemen, you have had an opportunity of watching their transformations: you have seen patches quickly succeeded by vesicles,

pustules, or papules, and have often observed a combination of these different forms of eruption in the same patient.

Although the study of these affections is apparently of small importance, it really possesses a much higher practical interest than is generally supposed. I hope to be able to prove this to you when I come to speak of symptoms met with in the great pulmonary and digestive organs, and which are somewhat analogous to the appearance of these cutaneous efflorescences upon the internal skin—the mucous membrane. We will therefore study the relations which may exist between the sudoral eruptions and the affections of the mucous membranes to which I alluded.

The number and variety of sudoral eruptions associated together in the same individual, and their transmutations, even when produced by the same cause, is an important fact. My friend Dr. Duclos of Tours, in his excellent work on sudoral eruptions, (published when he was my interne at the Necker Hospital), shows most conclusively, though in opposition to the views of many dermatologists, that it is impossible to establish distinction of species upon anatomical characters alone, as these characters differ according to the epoch at which they are studied, merge into one another, and do not retain specific characteristics throughout their duration.

To enable you to understand the subject now under discussion, it will be indispensable, as we proceed, that I recall to your recollection some points connected with the physiology of the skin. The cutaneous system is endowed with excreting and secreting functions. It excretes a certain amount of gaseous matter—carbonic acid gas, hydrogen, and nitrogen: it excretes liquids which it has secreted, the sweat containing solid matter, partly in a state of solution, and partly undissolved: finally, by its sebaceous glands, it secretes and excretes fatty products. When these different secretions and excretions take place in a normal manner; when on the one hand, in relation to quantity, evaporation, which is constantly going on, and secretion balance one another; when, on the other hand, in relation to quality, no alteration takes place in the composition of the products, there is no unusual cutaneous manifestation. But, if under the influence of a high temperature, or of any other exciting cause, the excretions become more abundant, though unchanged in quality, symptoms of irritation are soon seen. This irritation is partly produced by a precursory increased determination to the cutaneous

organs; and also partly by the deposition of an abnormal quantity of solid matter on the surface of the skin. These phenomena of irritation account for the exanthemata of which I am now speaking.

If an individual sweat profusely, even though he is in the plenitude of health, these special sudoral efflorescences will be observed: they will at times be very painful, and may bear the aspect of measles, roseola, urticaria, &c. I say the *aspect* only, and not the real characters. However great a similitude they may bear to the eruption of measles, they essentially differ from it in respect of the rapidity of development, absence of general precursory symptoms, shortness of duration, and absence of the symptoms which belong to measles. There are cases, however, in which the diagnosis presents some difficulty, as for example, when the eruption supervenes in children attacked with feverish catarrh, the result of a chill. In such a case, it is often impossible to establish the differential diagnosis on the first day: it is necessary to wait, for the surest way to avoid error is to observe attentively the progress and consecutive characteristics of the malady.

So is it also with sudoral scarlatiniform eruptions. During an epidemic of scarlatina, which prevailed at Paris, I was called in to a young girl supposed to have the current malady. After a paroxysm of fever accompanied by very profuse sweating, induced by the great heat of the weather and confinement to bed, an eruption identical in appearance with that of scarlatina came out over a great extent of the skin. The absence of the specific sore throat, the natural colour of the tongue, and the character of the general symptoms led me to conclude that the exanthem was sudoral. Next day, it had disappeared; and none of the symptoms which so often complicate scarlatina supervened.

These facts, gentlemen, are very sufficient to explain certain alleged second attacks of measles and scarlatina, and also the mildness of some supposed anomalous cases of these eruptive fevers.

Excessive perspiration, then, is in itself a cause of sudoral exanthemata. And precisely analogous consequences result from the excess of other secretions than those of the skin. Does not a too copious secretion of tears, which are perfectly inoffensive so long as they are secreted in not more than sufficient quantity to lubricate the surface of the eye, irritate the conjunctiva, and produce bright redness of the eyelids and even of the cheeks?

Hence you observe, that an exaggeration of the normal secretion

may lead to symptoms of irritation and inflammation in the mucous, as well as in the cutaneous membrane. Many cases of diarrhœa originate in causes analogous to those which produce sudoral exanthemata on the skin. Gentlemen, you are acquainted with that sort of reciprocity which exists between the cutaneous, intestinal, and urinary secretions. You are aware that inasmuch as they all act on the composition of the blood, from which they ought to remove certain matters useless for the maintenance of life, none of them can undergo any change without disturbing the equilibrium which existed between the secretions in relation to their influence on the blood. Hence it arises, that the diminution or augmentation of one secretion necessitates the augmentation or diminution of another: this is termed the antagonism of the secretions. Sometimes individual peculiarities, idiosyncrasies, exist, in virtue of which the elimination of products which ought to be excreted is accomplished by one emunctory rather than by another. Thus, in one person the skin will be, so to speak, more open than in another, and the least increase of the temperature of the atmosphere, the slightest exertion, or a little febrile excitement will cause profuse perspiration; while another will not be made to perspire by the greatest heat of summer. But in compensation for deficient elimination by the skin, the latter will probably pass large quantities of urine, and have frequent stools; for it is essential that elimination take place by some channel. Some individuals are at once seized with diarrhœa on exposure to a rather warm temperature, or on sleeping with an excess of bedclothes. They call in their physician to set them to rights, and he calls the attack acute enteritis: he is right, for the affection really is enteritis, just as the cutaneous exanthem caused by excess of heat is an inflammation of the skin. Both are the results of secretion, and consequently of increased determination to the parts; but the fact is not sufficiently recognised that both are phenomena of the same class. When, therefore, with a view to check excessive perspiration, we recommend the patient to diminish his covering, we augment in place of diminishing the intestinal flow. This effect is equally brought about, whether we give medicines which increase the determination to the intestine, or supplement the precautions against cold already taken by the patient.

There is also an antagonism between the secretions of the skin and those of the pulmonary mucous membrane; for as you know, gentlemen, abrupt suppression of the normal cutaneous exhalation

caused by a chill excites a mucous flux from the lungs, just in the same way that it excites a diarrhœa. These considerations will enable you to understand how it is that certain bronchial catarrhs are of the same nature as the cutaneous and intestinal affections of which I have been speaking, whether the determination to the mucous membrane of the respiratory passages be primary from individual predisposition, or whether that determination, after manifesting itself in the skin, and ceasing there, from some particular influence, had declared itself in the pulmonary organs.

Certain therapeutic indications obviously arise out of the considerations now stated. The production of diaphoresis by the action of appropriate drinks on the interior, is sometimes a successful means of treating bronchial and intestinal catarrh, and of removing alarming and unexplainable symptoms. But even when perspiration is excited for a therapeutic purpose, we may meet with sudoral eruptions. From among the cases which I could adduce in support of this proposition, I select the following communicated to me by Dr. Dumontpallier.

A child of four and a half years old, of a nervous temperament, but who generally enjoyed good health, was seized during the month of August, without any appreciable cause, with irregular intermittent diarrhœa. The child did not lose his appetite; but nevertheless, he grew pale, and went on losing strength, when, two days after a fit of great excitement, the diarrhœa became so severe, that within twenty minutes he had several stools: they were first yellowish, then serous, and at last choleriform. Neither vomiting nor cramps supervened, but the patient fell into a state of profound prostration, and, at the same time, the extremities became cold. The eyes were sunken, and the nose pinched: the pulse was small, thready, and very rapid: death was supposed to be impending. Proceeding to the most urgent indication, which was to restore the threatened powers of life, the child was made to take a dessert-spoonful of brandy mixed with an equal quantity of infusion of tea. The little patient was restless for a minute or two, and then fell into a calm sleep. During this sleep, his face was bathed with a profuse warm sweat; and the pulse rose. During the night, a little restlessness was observed, and the child directed his hands to various parts of the body, as if for the purpose of scratching himself. About six o'clock in the morning, his mother perceived that he was red from head to foot; and the physician, who had not left him, found that the whole

surface of the skin was covered with a sheet of strawberry redness, which was more conspicuous on the hands and feet than on any other situation. Rejecting the idea of an eruptive fever, of which the child had had no precursory symptoms, the diagnosis was reserved. The pulse was full, and less rapid. His sleep was tranquil, interrupted only by the itching. From the time at which the cutaneous reaction began, he had had no more stools. By noon, the danger was averted: and the scarlatiniform eruption had become pale, as well as less general. In its place, on different parts of the body, there were patches of urticaria, two of which, however, only remained till evening. The natural colour of the skin was restored: and the diarrhœa was at an end, for he had not had a stool for forty-eight hours. The intestinal functions, however, remained somewhat sluggish for a time, the child being only able to digest meat nearly raw. But in the course of a few days, under the influence of tonics and bitters, health was completely re-established.

It happens sometimes, though very seldom, that the symptoms to which I have been directing your attention show themselves simultaneously in the skin and the mucous membranes: thus, in some individuals, violent exercise always brings on both sweating and purging. All the emunctories seem in such persons to be scarcely adequate for the depuration of the blood from its superfluity of excrementitious matter. Here we see occurring physiologically, the same thing which we have already studied as a pathological occurrence in measles. I pointed out to you that the exanthematous determination takes place in measles simultaneously, and from the beginning of the attack, in the skin, intestinal canal, and air passages; as is manifested by the cutaneous eruption, the diarrhœa, and the bronchial catarrh.

Hitherto, gentlemen, I have spoken only of the effects produced by a change in the quantity of the elimination: I have now to consider the consequences of a change in its quality, of the formation of new bodies, various in their nature and origin, as manifested by different affections of the cutaneous and mucous organs.

Although modifications in the quality of the matter eliminated are not always physically and chemically appreciable, they are, even when not thus appreciable, indisputable, as can be analogically shown. In a great number of cases, chemical analysis demonstrates in the sweat, substances which have been absorbed internally: sometimes their presence is made known by physical signs, as is the case

when the sweat exhales the special odour of copaiva in persons who have taken that drug. Now, as in certain cases, these alterations manifestly coincide with the existence of cutaneous affections, are we not entitled to conclude that they also occur in the other cases in which these cutaneous affections occur, although we cannot physically or chemically prove that alterations on which they depend have taken place in the sweat? In the absence of physical characters, and chemical tests, the point is established by what I may call pathological tests.

A person, for example, lives on exciting diet, and under its influence, different exanthematous affections supervene, such as urticarious eruptions, which appear on some individuals after eating some kinds of shell-fish, mussels for instance, and crabs; in others, the same effect is produced by eating pork; and in others, again, by taking a variety of articles of food, the nature of which it would be difficult to specify. In point of fact, it is impossible to state in general terms, the conditions under which these eruptions take place, idiosyncrasy having beyond doubt the largest share in their production. Although we cannot in these cases demonstrate physically or chemically the modification which the sweat has undergone, it is evident that a modification has taken place, from the fact, that the affections of the skin determined thereby take place, although there is not the slightest increase in the quantity of the perspiration.

This fact will be made much more palpable by what I am now going to say regarding exanthemata produced by certain therapeutic agents; for in these cases no one will deny that an alteration has taken place in the sweat, although in numerous instances that alteration is appreciable only in its effects.

A patient, for example, takes opium to the extent of producing stupefaction. We know that under such conditions opium generally produces profuse sweating; and we also know that it is the most powerful and most energetic of all sudorifics. When, carried by the torrent of the circulation, it presents itself to the different emunctories, and particularly to the cutaneous emunctory, which is specially charged with its elimination: it there causes an irritation, and an eruption is observed on the skin, which may consist of red erythematous patches, pseudo-morbillous spots, vesicles, or true papules, if the action of the medicine have been long continued. Here then is a substance which imparts a peculiar quality to the excreted sweat, and determines a state of inflammation or irritation

of the skin, a transient state it is true, but nevertheless a state very different from that produced by a mere superabundance of natural sweat. This difference is not shown in the form, but in the intensity of the exanthem. So much is this particular inflammatory state dependent upon the special modification which the sweat has undergone in its composition, that in some cases we see the opium-exanthemata supervene when there has been no increased perspiration.

Belladonna given in certain doses also produces eruptions. In the case of this drug, the exanthem is generally scarlatiniform, as it also is when produced by datura stramonium, mandragora, and most of the poisonous solaneæ.

The effects which turpentine, and still more the effects which copaiba produces on the skin, are known to everybody. After continued use, and sometimes from the first day of taking them, the employment of these medicines is followed by sweats, the odour of which distinctly proclaims the agent which has produced them. Papular exanthemata result from their employment, and when their use is long continued, vesicular eruptions appear. Similar results sometimes follow the use of cubebs pepper. The eruptions are exceedingly fugitive, and do not in general continue longer than the period during which the perspiration retains the characteristic odour imparted to them by the drugs. These medicinal exanthemata have been, and are sometimes still, confounded with syphilitic roseola. From a scientific point of view, this is a deplorable mistake; and from a practical point of view, the error is even more deplorable, because it leads to the institution of antisyphilitic treatment, when our therapeutic measures ought to be limited to those required in simple gonorrhœa, devoid of all specific character.

This remark applies to the exanthemata which appear after the administration of iodide of potassium—an eruption which assumes an eczematous and then a pustular form, generally consisting of pustules of acne situated chiefly on the shoulders and face. There are persons, as you know, who cannot take even the most moderate doses of this medicine without having these eruptions, and suffering from pains in the throat, coryza, and intolerable lachrymation. When these pustules occur in the course of antisyphilitic treatment, they may be supposed to be of a syphilitic character, unless they are very carefully examined. A mistake of this kind at the beginning of the treatment would matter little, but at a later period,

it might be serious, by leading to the prolonged use of a medicine which ought to be discontinued.

The resemblance which I maintain exists between sudoral cutaneous exanthemata and some affections of the mucous membranes is peculiarly well marked in the class of cases I am now speaking of. The coryza, lachrymation, sore throat, and pustular affections produced by the iodide of potassium are all symptoms of the same class. Being all essentially dependent upon the action of this medicine, they all rapidly disappear upon its use being discontinued, and they all equally resist every kind of topical treatment so long as it is being taken.

These remarks are applicable to the eruptions produced by copaiva. When they supervene, there is an action on the skin of a nature similar to that which the medicine usually excites in the mucous membranes. Copaiva, turpentine, and all the oleo-resinous bodies, cause a congestive determination to the mucous membranes, which explains their beneficial influence in gonorrhœa, urethritis and bronchial catarrh : the balsams act by inducing a substitution, by exciting a therapeutic congestion which modifies the morbid or inflammatory state which we wish to subdue. When this fluxionary condition proceeds too far in the intestinal canal, the result is a kind of diarrhœa which may be regarded as analogous to sweating.

Many other substances produce similar effects on the skin and mucous membranes. The substances I have mentioned are those which are most employed in medical practice, and they are also those which most frequently produce sudoral exanthemata. I must not, however, omit to mention a concluding illustration. A patient, for example, takes mercury in large doses, and so brings on violent inflammation of the mouth and salivation. These symptoms become so violent that fever is excited, and with it profuse sweating sets in. The blood, changed in its character by the mercury, upon presenting itself to the cutaneous emunctories, there produces mercurial eczema that serious vesicular affection which Alley has described under the name of "hydrargyria."

Sudoral exanthemata are observed during the course of a great many diseases. The sweat, altered in its composition, acts as an irritant, and the eruptions of which we have been speaking supervene, whether or not there be an increase in the quantity of perspiration.

A patient has a large suppurating sore in some part of the body.

Absorption of pus takes place—not purulent absorption, nor absorption of putrid matter—but that kind of absorption always going on of the fluid part of pus, and of the materials dissolved in it. This exchange of materials between pus and the economy does not seem to exercise any injurious influence upon the system, provided the pus has not undergone any alteration. However, in persons with purulent collections, we sometimes observe a slight febrile excitement recurring at intervals, and followed by a critical sweat, as if the economy was getting rid of some of the matter imbibed from the abscess. It is under these circumstances that we see exanthematous affections, very various in form, but chiefly vesicular, and when the perspiration is profuse and long-continued, the eruption consists of pemphigoid bullæ. The squamous form is also sometimes observed. Indeed, it is unusual for a person to be laid up with protracted suppuration, without the skin becoming the seat of more or less extensive furfuraceous desquamation.

There are some people, whose blood, to use the common expression, is poisonous [*venimeux*]. Under the dominion of a true suppurative diathesis, the smallest wound, the slightest excoriation becomes the starting point of interminable suppuration in some people, an ophthalmia or coryza resisting every kind of treatment. In patients of this diathesis—chiefly children—you will often see eruptions, vesicular and pustular generally, supervene even after perspirations which are not very profuse.

The *miliary fever of lying-in women* is nothing more than a sudoral exanthem. The solution of continuity in the surface of the uterus caused by the detachment of the placenta necessarily suppurates during the reparative process, and thus places the woman in the condition of a wounded person, in point of fact, in the condition of the person in whom we were supposing that there was absorption of the constituents of pus. Both in one and the other, when profuse perspiration is induced, when that deplorable custom is adopted of covering the patient with an excess of bed-clothes, we see erythematous patches and measly spots in addition to the vesicular eruption which constitutes the miliary affection.

Beware, gentlemen, of supposing that these cutaneous eruptions are never serious. As I have just mentioned, Alley has shown that a general eczematous eruption may result from the excessive absorption of mercury, causing a terrible fever, and nervous symptoms which are often followed by speedy death.

A similar result too frequently occurs in the miliary fever of lying-in women. Miliary fever is not, as I have already remarked, a specific affection: it is merely a sudoral exanthem. It supervenes, when the woman has been shut up in a hot room, smothered with bedding, and neglected in those matters of cleanliness, more necessary to her after parturition than when in health. The perspiration secreted in unusual quantity, and impregnated with morbid elements imbibed from the surface of the intestine and from the mammæ, produces an irritation of the skin which assumes serious proportions.

Very recently I was sent for by my honourable friend Dr. Patouillet to see a young recently confined lady. Her nurse was an old woman imbued with the prejudices of last century. The lady had been kept without change of linen, soaking in the lochial discharge, and smothered with a mass of blankets for the alleged purpose of promoting the secretion of milk. From the sixth day of her illness, she had a scarlatiniform eruption; and four days later, she had, over the whole body, a confluent and frightfully violent eczema. Fever kindled in her countenance, delirium supervened; and this poor young lady died a victim to prejudices equally disgusting and dangerous.

These eruptions are most frequently met with in the disease called puerperal fever, and in purulent infection, to one of the forms of which puerperal fever has a great resemblance. Diarrhœa and bronchial catarrh, so common in puerperal fever and purulent infection, are produced by the same mechanism as sudoral exanthemata, that is to say, by the irritation carried to the external and internal tegumentary surface through the medium of the serosity of the pus in process of elimination by the natural emunctories. These symptoms supervene when, from the suspension of the cutaneous secretion, emunction has to be accomplished solely by the mucous membranes, or when the congestion arises simultaneously in the skin, respiratory passages, and intestinal canal.

The miliary eruption of dothinenteria has perhaps no other origin than sweat altered in composition by the absorption of putrid elements.

Let me remind you that vaccinal eruptions [*éruptions vaccinales*] are likewise sudoral exanthemata. I refer to eruptions essentially fugitive and very varied in form, and not to the eruptions of accidental vaccinal pustules to which I formerly directed your attention.

Sudoral exanthemata are also met with in small-pox during the period of desiccation. They generally assume the pustular form, but

it is impossible to inoculate small-pox by using the pus contained in these pustules. Perhaps these exanthemata consecutive to small-pox are due to the presence of the elements of pus in the sweat; for variolous patients may be compared to persons under the dominion of the great suppurations to which I formerly referred.

The intensity of the fever, the smartness of the reaction in the skin, and the alteration and modification of its secretions explain the production of the miliary eruption in scarlatina.

The mechanism by which the eruptive fevers accomplish their manifestations on the skin and mucous membranes has the greatest possible similarity to that which is in operation in the sudoral exanthemata. In both cases, there is a morbific matter in contact with the blood, which matter journeying with the blood presents itself to the different emunctories, and produces an irritation in them, the result being an eruption. The pathological lesion is equally produced by morbific principles traversing the emunctories, whether the agent be medicinal such as opium, belladonna, copaiva, and mercury, or pathological such as the elements of pus, the putrid elements of dothinenteria, the virus of small-pox, measles, or scarlatina. But in the eruptive fevers, the manifestations are always uniform, spots and patches being always produced by the same cause, whereas in the sudoral exanthemata very varied effects proceed from the same cause. In the latter, they are transient, like the cause which produces them: in the former, they are more persistent, for it is essential that, in accordance with a law almost invariable, the elimination of the morbid matter should follow a natural course.

The facts are similar in respect of chronic exanthematous affections related to acquired diatheses such as the syphilitic, or to original diatheses such as the herpetic and the scrofulous. But just as in acute diseases, the exanthematous manifestations take place in hours, days, or at most in weeks, so in diathetic diseases they are accomplished more slowly, and continue for a longer time. In syphilis, the cutaneous eruptions appear a month, two months, or even a year and more after the system has been infected. In the herpetic and scrofulous diatheses, they may even not appear till after a lapse of five, ten, twenty, or forty years. So true is this that sometimes it may not be till a late period of life that a person descended from herpetic or scrofulous parents, and bearing a constitutional resemblance to their organism, as well as to their external forms, shows signs of a diathesis till then silent.

The manifestations, according to the diathesis, are always of the same class, whether the action of the morbific principle be on the skin or on the mucous membrane. In respect of syphilis, all admit that this is the case: in the attacks of coryza, sore throat, and laryngitis which so frequently supervene in the second period of that disease, no one fails to recognise the influence of the venereal virus. It is visible in morbid vascularity, eruptions, and ulcerations: there are other cases in which if these lesions exist, they escape our means of investigation in the living subject, but the effects which we do see are not, on that account, the less dependent on the same cause. For example, diarrhœa, as I will tell you when I come to speak of certain anomalous effects of constitutional syphilis, sometimes supervenes as one of the earliest symptoms of the disease, being connected with the intestinal determination produced by the action of the morbid poison on the mucous membrane of the digestive canal.

In respect of the herpetic diathesis, do we not every day see its manifestations in the mucous membranes? And, in relation to the transition of the affection from the external to the internal integument, do we not constantly see persons under the influence of the herpetic diathesis take in succession eczema of the upper lip or inferior orifice of the nasal fossæ, or chronic coryza, leading sooner or later to ozæna? Here, the affection of the Schneiderian membrane is merely a propagation of the eczema, by continuity of tissue, from the external to the internal integument. In other individuals, granular sore throat will supervene, an affection of the nature and possessed of all the inveteracy of herpes, and which, like an herpetic affection, will give way when the diathesis manifests itself elsewhere in the economy. In other cases, the result will be deafness, caused by the extension of the lesion to the Eustachian tube. In coryza and sore throat you can follow, so to speak, step by step the march of the malady: you can see it approach nearer and nearer to the deep-seated parts: you can, for instance, see an eczema of the labia majora invade the vagina, attack the uterus, and so become the cause of obstinate leucorrhœal discharges. Herpetic affections of the mucous membranes are sometimes, also the first manifestations of the diathesis. At other times, they are consecutive to the disappearance, spontaneous or from treatment, of other affections of a similar kind occupying a larger or smaller surface of the skin. Manifestations of the herpetic diathesis are not confined to the mucous surfaces of which I have spoken, but are also met with in

those of deeper seat, such as the bronchial tubes and digestive canal. How often do we see a herpetic subject, when suddenly cured of a cutaneous affection, become a sufferer in the organs of respiration or digestion—a sufferer from bronchitis, dyspepsia, or intractable diarrhœa! Examples of this throwing inwards of herpes [*répercussion des dartres*] as our predecessors called it, cannot seriously be called in question. Let me quote a case in point published by my colleague Dr. Noel Gueneau de Mussy:—

"Some time ago," says my scientific friend, "I attended a lady of about sixty years of age, who for a long time had had chronic eczema of the right temple and cheek: she stated that the malady was extending, and she wished at all hazards to be freed from it. For some time, I opposed her entreaties; but at last, yielding, I prescribed depurative drinks, mild purgatives once a fortnight, and the application of a mercurial pomade to the seat of the affection. The eczema disappeared: but this was followed by an obstinate diarrhœa setting in, which did not yield till after two or three months of treatment, and then the eczema resumed possession of the parts which it had so long occupied."

"It is difficult," adds Dr. Gueneau de Mussy, "not to admit that there was something else here than the mere effect of derivation, and difficult to avoid explaining by the diathetic condition, the intestinal catarrh which continued with such obstinacy in spite of a regulated diet and rational treatment."[1]

Do you not find, gentlemen, that there is a great resemblance between Dr. Gueneau de Mussy's case and that which takes place in sudoral diarrhœa? Do you not find in it an example of that law of compensation and supplement, which I pointed out as existing for the two great emunctories, the skin and the mucous membrane of the digestive organs? Other cases might be mentioned, in which dyspepsia, bronchial catarrh, and inflammation of the cervical glands have followed herpetic affections of the skin. I have likewise seen sudoral symptoms occur simultaneously in the skin and mucous membranes: and the diathetic manifestations of syphilis, herpes, and scrofula may occur simultaneously in both integuments.

The possibility of these diathetic symptoms affecting internal organs is a fact of the highest importance, as it leads to therapeutic measures of daily application. Sulphurous mineral waters are re-

[1] Gueneau de Mussy:—Traité de l'Angine Glanduleuse.

markably efficacious in the treatment of certain bronchial, intestinal, uterine, and vesical catarrhs, depending upon the herpetic diathesis, because they exercise a remedial influence upon it. You are going perhaps to send your catarrhal patients to Cauterots, Bagnères-de-Luchon, Aix, and Enghien; but before doing so, ascertain whether they ever had herpetic manifestations in their youth, or at any time in the course of their lives. You will then know what you are about.

Gentlemen, thoroughly realise the fact, that some catarrhal affections are simply exanthemata of the mucous membranes. A chronic bronchitis, for example, has come on under the influence of a chill, but the chill was only the exciting cause which determined the direction of a fluxion, in virtue of which the herpetic principle was carried to the mucous membrane of the respiratory passages, just as it is carried in other cases to the vagina and uterus, or, still more frequently, to the skin.

All the considerations into which I have now entered lead to practical conclusions. It is important to know whether cutaneous exanthemata proceed from mere excess, or from vitiation of the natural secretion of the skin. How often has the most simple hygienic advice given in virtue of such knowledge enabled a patient to get rid of an affection which must otherwise have become a very obstinate disease. You may thus have it in your power to snatch from death patients suffering from the general eczema so formidable in hydrargyria, or you may save lying-in women by having the courage to remove their superfluous bed-clothes, to have them washed several times a day, or even plunged in a bath. Under the influence of these simple means, they will almost immediately lose their sleeplessness, burning heat of skin, and unbearable itching. I cannot sufficiently impress on you the magnitude of the services you may be able to render to your patients, if you thoroughly realise the importance and frequency of sudoral exanthemata; and if with a view to cure them, you have the courage to fight against the deplorable prejudices propagated by physicians of a former century, and which it is your duty to endeavour to eradicate.

LECTURE XV.

DOTHINENTERIA, OR TYPHOID FEVER.

Specific Lesion.—Furuncular Eruption of the Intestine.—Intestinal Perforation.—Peritonitis without Perforation.

Gentlemen :—A young man of eighteen, who had lived in Paris only for the two previous years, was admitted to St. Agnes's ward on the 19th February, 1859. He had been ill for eight days. His illness commenced with debility, lassitude, pains in the limbs, repeated rigors, headache, and distressing insomnia. At first, he struggled against these symptoms, but at the end of four days, he was obliged to keep his bed. I found him lying on his back, and feverish, with a rapid pulse, and dry hot skin. The tongue was dry, red at the point, and covered with a slight whitish fur. There was gurgling in the right iliac fossa, but no abdominal tympanites.

On the 22nd February, there was tympanites, and diarrhœa. The fever was great, and accompanied by delirium. Next day, the abdomen was covered with an eruption of rosy lenticular spots. On the 26th and 28th, there was an increase of severity in the symptoms. On the last-mentioned day, the tongue and teeth were fuliginous, the diarrhœa continued, and the stools were passed involuntarily. As there was retention of urine, it became necessary to use the catheter. On the 29th, the delirium was less violent, the fever had subsided, and the tongue was not so dry. On the 30th, the improvement was still more visible : the abdomen felt soft : he was able to pass his water naturally : the skin looked healthy, the pulse had fallen to 92 from 108, which it was in the early days of his attack : and his intellectual faculties were clear. Recovery proceeded continuously till the 18th March, when, it being complete, he left the hospital.

The entire treatment in this case consisted of lavements of infu-

sion of camomile, administered twice in the twenty-four hours, on the 28th and 29th February, and on each of these days a draught composed of twenty grammes of balm-water, one gramme of ammonia, and forty grammes of syrup of orange-peel. In accordance with my usual practice in similar cases, I ordered the patient to have every day some spoonfuls of meat-soup and beef-tea.

In the history of this case, gentlemen, you have recognised the disease generally known by the name of *typhoid fever*, a disease of which it is very unusual for us not to have some cases in our wards. It is one of the maladies most commonly met with in practice, and is found in all temperate climates. It is endemic in some places, specially so in the great centres of population, and this is perhaps more particularly the case in Paris, where every family pays a heavy tribute to it, where foreigners, on coming to reside, are soon attacked by it, and where, as an epidemic, it periodically spreads very cruel desolation. As, probably, there is not one of you who is not brought into contact with this disease at the very threshold of his medical career, I am desirous, without attempting to discuss the whole subject, to enter upon some considerations in connection with the cases which you have seen, calling your attention to certain peculiarities which they presented, and instructing you in what my experience has taught me.

You are aware that, at present, under the name *typhoid fever*, are included all the varieties of the nosological species formerly known as the *synochus putris* of Cullen, the *putrid* fever of Stoll, the *malignant nervous* fever of Huxham, the *mucous* fever of Rœderer, the *bilious* fever of Tissot, and the *adynamic* or *ataxo-adynamic* fever of others. It is the same disease which MM. Petit and Serres[1] have called *entero-mesenteric* fever, and which Bretonneau has described under the name of dothinenteria [*dothienentérie*], to indicate the special nature of the intestinal affection which characterises it—a furuncular eruption on the intestine—from δοθιὴν, a pimple, pustule, or furuncle, and ἔντερον, the intestine.

This name—dothinenteria—is now the prevailing name of typhoid fever. Names are not of much consequence if there is an exact understanding as to the meaning attached to them, for then they cannot give a false notion of the thing named. The term "typhoid" has been substituted for "putrid," "malignant," and "adynamic,"

[1] Petit et Serres :—Traité de la Fièvre Entéro-Mésentérique. Paris, 1813.

but it is a term quite as faulty as they are. Conveying as they all do the idea of an essential character, of a special symptom, that particular symptom ought—according to the laws of good nomenclature—to be always found in the disease, and never found in any other disease. But this is very far from being the case in respect of the malady now before us. On the one hand, typhoid phenomena, even the phenomena of putridity, malignity and adynamia are often wanting in the fever called "typhoid," "putrid," "malignant," and "adynamic;" and on the other hand, they are often met with in diseases essentially different from it. The preferable name then is dothinenteria, because the furuncular eruption on the intestine is as constant and special in this disease as the pustular eruption on the skin in small-pox. It is the name I prefer, though I still employ those of "typhoid fever," and "putrid fever," in conformity with universal usage.

Dothinenteria is an acute, febrile, and general disease, bearing more than one striking point of resemblance to the eruptive fevers. Chiefly attacking young persons, not occurring in general more than once in the same subject, and being undoubtedly contagious, it has three characteristics common to it and the eruptive fevers; and like them, it also has, as a special character, anatomical lesions, consisting in it of an eruption on the skin, and an eruption on the intestine. The former, called the rosy lenticular spots [*taches rosées lenticulaires*], is much less characteristic than the latter, although some have wished to make the cutaneous eruption the stamp of the disease, and to look on the intestinal lesion as only a secondary and consecutive sign. The rosy spots are often wanting; and, to quote from statistics, I may mention that Chomel, in seventy cases, could not find any trace of eruption in more than sixteen, though it was searched for at all stages of the disease. If it be argued, that the absence in some cases of the eruption on the skin, no more disproves the exanthematous nature of dothinenteria, than *variolæ sine variolis* disproves the exanthematous character of small-pox, I reply, that cases of *variolæ sine variolis* are infinitely more exceptional than cases of typhoid fever without rosy spots. In some localities, as at Paris, the spots are found with sufficient constancy to justify our looking out for them as the most obvious pathognomonic sign, but there are other places in which attentive observers have never been able to see them. They were entirely wanting in different epidemics in Touraine. Far be it from me, however, to dispute the sympto-

matic value of this eruption in the cases in which it is present. What I say, gentlemen, is, that the cutaneous eruption of dothinenteria cannot be regarded as the essential character of the disease—that essential, specific character is the intestinal lesion.

On the 21st of June last, you had an opportunity of seeing the nature of this lesion in the body of a patient examined in your presence. On our opening the intestines, you saw the mucous membrane covered with a copious eruption formed by the *glandulæ agminatæ* of Peyer in a very turgid but not in an ulcerated state, some of them being in relief, to the extent of the thickness of a silver five franc piece: some of the solitary glands were equally turgid; and the mesenteric glands were enlarged. The patient was admitted to the clinical wards on the 14th of June, and died four days afterwards. We could obtain no information as to the date at which the dothinenteria commenced. Still, the nature of the intestinal lesions, the glands of Peyer being turgid but not ulcerated, informed me that the disease had not lasted more than twelve or fourteen days.

The anatomical researches undertaken for the elucidation of this subject by Bretonneau in 1818, and subsequently, when I was his pupil at the hospital of Tours, have enabled me to study the progress of the changes which take place in the glands of the intestine, and to describe from day to day the changes which they present. I have published the results of my labours; and you will find them in the *Archives Générales de Médecine* for January 1826.

The characteristic dothinenteric eruption, formed at the expense of the aggregate and solitary glands of Peyer, does not begin to appear till the fourth or fifth day, and sometimes, according to Professors Chomel and Louis, (from whose opinion I differ,) not till the seventh or eighth day. It is progressively accomplished in two days, all the glands destined to be implicated not becoming simultaneously affected; but the eruption is complete, at the latest, by the seventh day of the disease. The aggregate glands become turgid, and increased both in length and breadth: the solitary glands project into the intestine: at the same time, the mesenteric glands communicating with the aggregate and solitary glands, share with them the pathological changes which are going on, and become enlarged.

The turgescence of the glands goes on increasing up to the ninth day. On the tenth day, one of two things occurs:—resolution begins, or the affection continues and proceeds through all its stages.

In the first case, the turgescence of the aggregate and solitary glands of Peyer, and of the mesenteric glands begins to decrease, and goes on gradually subsiding up to the fourteenth day, at which date the affected glands are still a little swollen; but by the end of the third week, resolution is complete, excepting that the mesenteric glands do not quite regain their normal condition till a short time later. In the second case, some patches of the aggregate glands of Peyer proceed towards resolution, whilst other patches go on increasing in size: the same may be said of the solitary glands, some of which proceed to resolution, and others become more and more affected by the disease. The mesenteric glands, however, have always decreased in size.

On the twelfth day, the intestinal affection, till then pimply [*boutonneuse*] becomes to some extent furuncular [*furonculeuse*]. The diseased glands become prominent, presenting the appearance of red conical granulations [*fongosités*], with slight erosions on their summits, which increase in size, till they form on the fourteenth or fifteenth day a core [*un bourbillon*] of reddish tissue, deeply stained with an ochre hue by the bile, which at this period of the disease is abundant and has a special tint: the sphacelated tissue is adherent at its base, and is implanted in the centre of an extensive ulceration. On the following day, the core is entirely detached, and in its place there is a deep ulceration, at the bottom of which, generally, is the muscular coat of the intestine. Sometimes five or six ulcerations of this description may be seen on one patch of the aggregate glands of Peyer, giving it an irregular fungous appearance, so as to render it difficult to recognise the existence of the gland which is the seat of this disorganization. All around, isolated ulcers occupy the place of the solitary glands, which have been destroyed by the same inflammatory action. The mesenteric glands, in colour resembling the lees of wine, are for the most part so soft, that when cut into, or pressed between the fingers, they become almost a pulp.

After the seventeenth and eighteenth days, the edges of the ulcerations are less prominent, the depth of the ulcers has diminished, and the intumescence by which they were circumscribed has begun to disappear. By the nineteenth, twentieth, and twenty-first days, the ulcerations have become superficial, and have a tendency to cicatrise. About the twenty-fifth day, cicatrization is complete; but generally, the cicatrices are not consolidated till the thirtieth day. Some ulcerations, however, remain for fifteen, twenty, or

thirty days longer, particularly in the glands situated at the extremity of the small intestine.

Such is the intestinal eruption of dothinenteria, and such are the different phases through which it passes. The lower portion of the ileum is the situation for which it has a preference; and when the eruption only occupies from three to ten inches of the small intestine, the portion occupied is the lower end of the ileum: the nearer the eruption is to the ileo-cæcal valve, the more confluent is it. I have never found spots beyond the second portion of the jejunum, ascending towards the duodenum and stomach: they become more numerous in the large intestine, the nearer they are to the cæcum.

Gentlemen, you will always find these intestinal lesions on examining the bodies of persons who have died of typhoid fever, whatever form it may have assumed, whatever may have been the variety or intensity of the symptoms, provided death has taken place after the fifth day, the period at which these lesions begin to appear.

In connection with the intestinal lesion, I ought to mention a theory of Virchow. According to this celebrated anatomist, and according to contemporary histologists, the follicular crypts of the intestine, the Peyerian patches on the one hand, and the Malpighian tufts of the spleen on the other, have the same structure and functions as the lymphatic glands: they are formed of a *gland-tissue*. And as it is looked on as proved that the lymphatic glands produce the white corpuscles, it follows that hypertrophy of the follicular crypts, Peyerian patches, and Malpighian tufts in typhoid fever lead to the superabundant production of white corpuscles, or in other words, to leucocythæmia, at least in the first stage of the disease.[1] At a later period, the excessive formation of the constitutional elements of lymph and nuclei distend, and ultimately destroy the reticulated texture of the glandular tissue. This of course terminates the leucocythæmia.

This description is substantially nothing more than a statement of facts disclosed by microscopic observation. The solution of the question is not advanced one step. In cholera and other diseases, there is a similar superabundant production by the Peyerian glands, while the progress of the symptoms and of the anatomical lesions is very different from those of typhoid fever. In this difference resides the essential character of the disease. The symptoms and

[1] Virchow:—La Pathologie Cellulaire. [Traduction de Paul Picard.]

the lesions are different, because the morbid impetus—or whatever else you like to call it—is different. We are obliged, therefore, notwithstanding the microscopical investigations, and even in consequence of them, to inquire into the causes which produce the disease, into the contagion, the epidemic influence, the nature of the symptoms, and the specific characters of dothinenteria, of which the intestinal lesions, as well as the lesions in other parts of the body, are the effects and not the cause.

Gentlemen, you perceive by the description which I have given you, that the intestinal eruption proceeds with an order and precision, which can only be compared to what we see in distinct smallpox. As I do not wish to leave an erroneous impression on your minds, it is necessary, however, to state that while the description which I have given applies to the majority of cases, there not unfrequently occur modifications in the form and progress of the intestinal exanthem, which it would be useless to point out here, but which impress on it characters somewhat different from those I have assigned to it.

Cases have been adduced in which there was no appreciable alteration of Peyer's glands, but they are as exceptional as cases of smallpox without eruption, and possibly they were cases of the "typhus fever" of the English, or the "typhus exanthematicus" of the Germans. Let me add that there are some formidable diseases which for the first few days by simulating dothinenteria, throw off their guard unobservant and inexperienced physicians. You have seen a considerable number of cases in which the general symptoms at first consisted only of a feeling of discomfort, lassitude, pains in the limbs, and a certain amount of uneasiness in the bowels—the tongue, slightly red at the point and edges, covered with a thin whitish fur, was a little swollen, so as to show the marks of the teeth—there was anorexia, with little or no fever, and the pulse sometimes even below the normal frequency—the skin was somewhat dry—and there either were no stools, or the bowels were as regular as usual. We sometimes see our patients continue in this condition for from twelve to thirty days, without the symptoms being sufficiently urgent to oblige them to take to bed; but at other times, after this stage has gone on for twelve or fourteen days, formidable symptoms all at once set in, it may be without appreciable cause, or it may be from indigestion caused perhaps by eating quite moderately, and then the disease declares itself by more characteristic

symptoms, and with more or less severity. Well! in these cases of mild dothinenteria, to which the term "latent" has been applied, you will have been able to verify the existence of the intestinal eruption quite as well as in cases attended by the most dangerous symptoms.

Nevertheless, it must not be supposed that the furuncular eruption is the entire disease, that the disease is nothing more than an inflammatory affection, an enteritis, as is alleged by those who have given it the name of "follicular enteritis:" nor must we suppose that the general are more under the influence of the local symptoms, when the intestinal lesions are deepest and most extensive. The enteritis which characterises typhoid fever has at the autopsy a special character, but it is only one of the elements of the disease. As Laennec remarked, the alterations in the intestinal canal which occur in typhoid fever are no more the cause of its general symptoms, than the variolous, morbillous, and scarlatinous eruptions are the causes respectively of small-pox, measles, and scarlatina. So far, however, from the eruptions being the causes of these diseases, there are some cases (very exceptional I admit) in which they are wanting, and they are always developed after the symptomatic manifestations of the fever. Finally, if in the mild cases, the dothinenteric eruption may consist only of very distinct spots, cases have been adduced in which (from death occurring suddenly in consequence of a perforation of the bowel) there has been seen an eruption very confluent in character and presenting numerous ulcerations; while, in contrast, there have been found affected only one or two Peyerian patches in other cases in which death occurred about the fifteenth day of very violent attacks of typhoid fever. My opinion may be summed up in a few words:—as a general rule, in dothinenteria, contrary to the general rule in other eruptive fevers (particularly in small-pox and scarlatina), *the severity of the general symptoms bears no relation to the intensity of the eruption.*

The eruption, though it be a local symptom, is not the less deserving of our serious consideration, for it explains the consecutive abdominal pains which continue for weeks and months, after recovery from typhoid fever; and also, because it is very frequently, during the attack, the starting point of a mortal complication. About the fifteenth or sixteenth day, at the time when the fleshy core separates, an ulceration forms, which, destroying more or less deeply the coats of the intestine, may proceed in a few days to perforation. During the period of the cicatrization of the ulcers, we

must bear in mind the risk of *intestinal perforation*, which by producing very acute peritonitis, carries off the patient with frightful rapidity: You will see such occurrences not only in severe typhoid fever, but even in those cases which are so mild as to be difficult of diagnosis.

You are acquainted with the symptoms of peritonitis resulting from perforation. Whether it occur during the progress of the disease, or during convalescence, the individual is suddenly seized with violent pain in the bowels: this pain is increased on pressure, and rapidly extends to the whole abdomen. At the same time, hiccup, nausea, and intractable vomiting of green and leek-green matter set in: a pale, collapsed countenance tells of the pain and anxiety which is being endured: there is considerable fever, and the pulse is small and rapid: there is suppression of urine: the skin is covered with a viscid sweat; and the patient sinks within a period more or less brief. On examination after death, we find the lesions met with in cases of very acute peritonitis; and on examining the intestinal canal, we soon find the perforation, which has been the starting-point of the mischief, and which is always situated in one of the ulcerated Peyerian patches. Sometimes there are several perforations; but there are cases in which we cannot discover any, however attentively we look for them: moreover, there are cases in which it is difficult to see the slightly prominent patches of Peyer, which present no traces of inflammation or ulceration.

These are the cases in which we have to do with *spontaneously developed peritonitis*, a subject on which my friend Dr. Thirial has communicated an interesting work to the Hospitals' Medical Society.[1] Here is one of the cases which he gives.

A girl of twenty-one had typhoid fever in a mild form. After the malady had gone on for about twenty days, she was entering upon convalescence, and beginning to take food, when, after strong mental emotion, she was suddenly seized with very alarming symptoms, pains in the bowels, bilious vomiting, great change in the countenance, depression of pulse, and general prostration. From these symptoms, exceedingly well informed physicians without hesitation diagnosed peritonitis, the result of intestinal perforation. Twenty leeches were immediately applied to the abdomen. On the following day, there was no improvement in the state of the patient. It was

[1] Thirial:—Numbers 83, 84, and 85 of Union Médicale for 1853.

then resolved to have recourse to narcotics in large doses, thus adopting the practice from which Stokes of Dublin had in similar cases obtained beneficial results. Twenty-five centigrammes of the thebaic extract were prescribed to be taken within twenty-four hours. Complete abstinence from fluids, and absolute immobility were also enjoined. Notwithstanding this treatment, the vomiting continued: the tongue became dry; and there was no improvement in the other symptoms, with the exception of the abdominal pain. From the first day, it was tolerably bearable, and had nearly ceased by the third day, the patient not feeling it, unless pretty strong pressure was made on the abdomen. The treatment was continued; but in the evening the patient died, that is to say, in seventy-two hours from the onset of the alarming symptoms.

The autopsy established the existence of peritonitis. The intestines, throughout the greater part of their extent, were covered with a layer of coagulable lymph, which was soft and recent. The cavity of the pelvis contained four or five ounces of a milky fluid of purulent character. The mesentery was in particular covered with pseudo-membranous deposits of very slight consistence, and of variable thickness. Notwithstanding the most diligent search, not the slightest intestinal perforation could be detected. The intestinal canal was found to be perfectly healthy, excepting that towards the end of the ileum, particularly at the ileo-cæcal valve, there were four or five patches, not prominent, but presenting a blackish colour: these were Peyerian glands which had been diseased, but had reached the period of resolution. In no situation in the intestinal canal could ulceration or erosion be discovered. The other abdominal organs were healthy: the spleen was small and firm: the liver was normal: the posterior part of the lungs were a little gorged.

Two similar cases are described in the work of Professor Jenner of London.

Possibly some of the cases of alleged recovery from intestinal perforation are nothing more than cases of this class; but still, gentlemen, the case I am about to narrate, and which you have had an opportunity of observing in the clinical wards, explains the possibility of recovery, and the mechanism by which it is accomplished: it also shows how peritonitis without perforation is produced by what may be called propagation.

You recollect a woman who lay in bed No. 31 of St. Bernard's

ward. Three days before admission, she had left the St. Louis Hospital, where she had had a severe attack of dothinenteria, which had lasted six weeks. She was thin and pale, and had a great deal of fever. She complained of pains in the lower part of the abdomen, which were increased on pressure. She had diarrhœa, and was vomiting yellowish bilious matter. There was considerable enlargement of the liver and spleen. My diagnosis was—peritonitis consecutive to typhoid fever; and I thought that she had had a relapse of the fever, from observing some recent rosy spots on the abdomen.

Six days after her admission, the symptoms of peritonitis seemed to be subdued, after the administration of minute doses of calomel —five centigrammes, divided into ten doses, having been given daily. The pains were less severe, and the abdomen had regained its natural softness. But there were very alarming chest symptoms. Respiration was difficult and hurried. On auscultation, we heard, before and behind, on both sides, numerous mucous and sibilant râles: they were most abundant in the lower and posterior region of the right side, where they were likewise finer and sub-crepitant: in the same situation, there was dullness on percussion. She spoke in a brief and panting manner. There was more fever than on the previous days.

On the following day, there was a profuse mucous expectoration which adhered to the vessel, and some of which had a slight ochreous tint, showing that bronchitis had penetrated to the extreme ramifications of the tubes, and was gaining the pulmonary parenchyma itself. The cough, the stethoscopic signs—that is to say, the fine mucous and sub-crepitant râles—and the dullness at the base, confirmed this diagnosis. Still, as there was neither blowing sound nor crepitant râles, I could not pronounce the word "pneumonia." In five days, all these symptoms had yielded. Notwithstanding the diarrhœa, I had given the precipitated sulphuret of antimony in daily doses of 50 centigrammes, administered in pills, each containing 10 centigrammes. A drop of laudanum was ordered to be taken with each pill. The cough and expectoration were less. The normal sound returned to the part in which dullness on percussion had been observed: only the sibilant and coarse mucous râles were audible; and the breathing was easier. The abdominal symptoms however continued without change; and there was only a little diarrhœa, which at last yielded to the sub-nitrate of bismuth

combined with chalk, to the extent of 4 grammes of each given daily, divided into eight doses, till the twelfth day, when continuous delirium set in, along with general puffiness unaccompanied by albuminuria, and an aphthous condition of the mucous membrane of the tongue and mouth. In consequence of these new symptoms, I prescribed cinchona, to the extent of a gramme a day, in coffee without milk. The symptoms continued without intermission for four days; and then the patient died, on the fifteenth day from the date of her admission into the Hôtel-Dieu.

At the autopsy, we found the usual lesions of peritonitis. All the intestines were glued together by false membranes, which were easily torn. The adhesions formed pouches filled with pus; and there was no trace of any effusion into the abdominal cavity of the contents of the intestine. On the concave surface of the diaphragm, in the small hollow, the parietal peritoneum was red, presenting vascular arborizations and purulent striæ.

On exposing the intestine, the serous surface of which was covered by purulent matter and vascular arborizations forming red patches, we saw, towards the lower portion of the ileum, spots of a blackish brown colour, around which there irradiated vascular arborizations more conspicuous than elsewhere. The corresponding portion of the peritoneum was thickened, and puckered like the edges of that kind of purse which is shut by pulling running cords: all the folds of the serous membrane converged towards the black spots of which I have spoken. On opening the intestine, we found that these spots corresponded to the ulcerations which had destroyed the mucous and muscular coats of the bowel, and had reached the peritoneal coat, which formed their floor. These ulcerations of Peyer's glands, characteristic of dothinenteria, were from eighteen to twenty in number, and were situated in the lowest meter of the small intestine, and the nearer they were to the ileo-cæcal valve, the more confluent were they. In that situation, the whole surface was one vast ulcer, deeply excavated, and jagged at the edges. In the last foot of the ileum, in the centre of two large ulcerations, there were perforations with thin blackish edges, and of the size of a twenty centime piece. In the ulceration nearest to the cæcum, blackish filaments were floating, the remains of the furuncular core, in the seat of which the perforation had taken place.

The explanation of the absence of intestinal matter in the peri-

toneum is the stopping up of the perforations by the intestinal adhesions, and the manner in which the convolutions were glued together.

The whole of the lower portion of the intestinal canal was arborised: the arborizations were placed closest together where they were nearest to the ulcerated parts.

The mesenteric glands were swollen, softened, and reduced to a reddish pulp. The tissue of the spleen and liver, both of which were considerably enlarged, was soft, and broke down under pressure. The lungs were congested, but not hepatised. The encephalon presented no appreciable lesion.

This case, gentlemen, as I have already said explains how the reparation of intestinal perforations, as reported by Stokes and Graves of Dublin, as well as by other physicians, may take place; and it also points out to us the pathogeny of peritonitis occurring in dothinenteria without perforation.

The peritonitis may be the consequence, as in our patient, of ulceration reaching the peritoneal coat of the intestine, which it does not destroy, but in which it excites inflammation. Supposing the ulcerations to be very few in number, and very far apart from one another, the inflammation developed in the corresponding portion of peritoneum may remain within a very limited space, and be devoid of danger; but supposing, either that the ulcerations are numerous and confluent, or that the inflammation of the peritoneum steadily creeps on, as in erysipelas, the peritonitis, becoming general, may destroy the patient.

These cases of partial peritonitis, then, explain the possibility of recovery when perforation of the intestine has taken place. Perforation does not occasion death, except by the violent and general peritonitis set up by the passage of the contents of the bowels through the perforation into the cavity of the peritoneum. Now, when adhesions have been formed between the intestinal convolutions consecutively to the inflammation of their serous covering, the passage of the contents of the bowels is prevented, because the ulcerated openings are shut up by the gluing together of the intestines: and we can understand these adhesions continuing sufficiently long to allow cicatrization of the solution of continuity to be accomplished, and the patient to recover.

It was by the operation of the mechanical cause which I have now explained that the woman in the case under consideration did

not succumb in consequence of the perforation. She died from general peritonitis produced by the extensive ulceration of the intestine reaching the serous membrane, and not from sudden general peritonitis consecutive to perforation and escape of fæcal matter; for, as I pointed out to you at the autopsy, the convolutions of intestine were glued together in such a manner as to prevent that escape.

In respect of diagnosis, the symptoms are the same whether the peritonitis be or be not the consequence of perforation. It has certainly been alleged that peritonitis consecutive to perforation may be recognised by the spontaneousness and excessive acuteness of the pain declaring itself first in the region of the cæcum and second portion of the ileum, the situation in which perforations are most common, soon extending to the whole abdomen, and being aggravated by pressure; and it has also been alleged that in peritonitis consecutive to perforation, there is always suppression of urine. These signs, however, are of very little use as guides to a differential diagnosis, which can only be established by an examination of the body after death.

Were such a differential diagnosis possible, it would have some importance in respect of prognosis, because peritonitis without perforation is not so serious as peritonitis from perforation, which is almost inevitably fatal. The impossibility of ascertaining during life the nature of this abdominal complication justifies our worst fears as to the issue of a case in which it exists. Finally, gentlemen, you can understand from what I have said, that, considering the alterations to which the intestinal canal is liable in dothinenteria, you ought to be reserved in your prognosis in this disease, recollecting that even in cases in which the appreciable signs are indicative of a mild attack, at the very time when your patient seems to be out of danger, and you are going to announce his recovery, you may witness the symptoms of that terrible complication, intestinal perforation, or of peritonitis without perforation, a complication which though less formidable, is very dangerous.

Intestinal Hæmorrhage.—Hæmorrhagic Putrid Fever.

A woman, aged 64, was admitted to the Hotel-Dieu on the 7th March, 1859, where you saw her lying in bed No. 31 of St. Bernard's Ward. I call your attention to her age, because, as a general rule, dothinenteria only attacks young subjects. This woman

died on the seventh day after admission, having been carried off by a complication regarding which I now wish to speak.

When she came into our wards, she was delirious, and in a state of great prostration. The bowels were in a sluggish condition: pressure over the iliac fossa did not occasion gurgling; and there was no diarrhœa. The pulse was 108: there was a little dyspnœa, with some sub-crepitant râles at the base of the right lung. The spleen was not enlarged. We learned that the illness began with headache and shivering.

Next day, I observed spots on the abdomen, possessing some of the characters of typhoid spots. Three days later, their typhoid character was undoubted. On that day, there was marked amelioration of the symptoms. In the evening, my *chef de clinique*, M. Moynier, saw the patient taking some meat soup with appetite, and complaining that it was insufficient in quantity: three hours later, abdominal hæmorrhage set in so profusely that the blood inundated the bed, and flowed over on the floor of the ward. In less than an hour, the patient was dead.

At the autopsy, the upper portions of the small intestines were found to be healthy; but in the lower portions, the following lesions were seen. The Peyerian patches were very much affected. At about six or eight centimeters from the ileo-cæcal valve, one of the patches was ulcerated in such a way as to expose the bare peritoneum: its edges were turgid, and its surface was covered with detritus exhaling a fœtid odour. A little higher up, there were other patches of about one or two centimeters ulcerated, so as to lay bare the muscular coat of the intestine. The patches were hypertrophied, and softened. The solitary glands were also in a very diseased condition. The intestine contained a large quantity of blood, which had imparted a reddish black colour to the mucous membrane. There was no fæcal matter in the intestinal canal. The mesenteric glands were blended together in an enormous mass of fat. From the lesions now described, it is evident that the disease had reached its fourteenth or fifteenth day. In size, the spleen was natural, but it was of a very soft consistence. The liver had lost its natural consistence, and was hypertrophied. Both lungs were congested. The heart was distended with black clots. There was no lesion of the brain.

This is the third case which I have seen within seven years of a person dying of intestinal hæmorrhage in the course of an attack of

dothinenteria. In the two other cases, the patients did not die from the immediate consequences of the loss of a large quantity of blood, as in the woman whose case I have detailed. One of them was seized on the twenty-third or twenty-fourth day with intestinal hæmorrhage, which recurred at intervals during three or four consecutive days. Death took place in consequence of these successive hæmorrhages, the patient having been reduced to a state of anæmia and profound debility. The other patient, on the nineteenth day of the typhoid fever, had ataxic nervous symptoms, when a moderate attack of hæmorrhage supervened, after which a great improvement was observed in the condition of the patient, which continued for eight days. Then, however, the nervous symptoms returned, and she had a second and a third attack of hæmorrhage. The nervous symptoms, in place of becoming calmer, as after the first loss of blood, increased in severity and carried off the patient.

Intestinal hæmorrhage is a frequent complication of dothinenteria: it is perhaps even more common than is generally believed, judging from the fact, that it is often not till the autopsy that its existence is revealed: in such cases, on opening the intestinal tube, we may find a greater or less quantity of blood, none of which has passed below the ileo-cæcal valve. While a somewhat profuse hæmorrhage into the bowel might be suspected during life from the general symptoms, such as increased debility and a sudden paleness of the skin, a more moderate loss of blood might escape notice. Generally, the hæmorrhage shows itself externally; and, according to the nature of the case, the blood is passed almost pure, in a state which though not pure admits of easy recognition, or in a very altered state: when it has remained long in the intestine, it is a blackish matter resembling tar in appearance.

You will read, and you will hear said by everybody, that these hæmorrhages are formidable complications, and increase the danger of the disease. This is the opinion of the most reliable physicians; but nevertheless, when thus expressed, it is far too absolute; and as for myself, I confess, that after holding that opinion for a long time I now profess the opposite doctrine, believing that hæmorrhages in typhoid fever, so far from possessing the character of danger imputed to them, are usually of favourable augury. Such is also the opinion of Graves. When I read this proposition for the first time in the clinical lectures of the Dublin professor, being still under the dominion of opposite views in which I had been educated,

I was amazed that a man of such sterling merit and high repute should disagree with me in a matter which I believed I understood. However, the opinion of so great an authority caused me to reflect, and reviewing the cases which I had seen, I recollected recoveries in cases in which hæmorrhages had occurred. I, therefore, from that time directed my attention more diligently to the point: and I now say, that while the three cases of which I have just spoken seem to confirm the prevailing idea as to the gravity of intestinal hæmorrhages in typhoid fever, I can cite as a set off to them a much greater number in support of the doctrine of Graves.

Without going beyond our wards in search of examples, I will recall two cases which occurred under your own observation.

A girl aged 20, of good constitution, was admitted to bed No. 5, St. Bernard's ward, on the 14th October, 1857. She had been ill for eight days, but had not been obliged to take to her bed till the fourth day. The dothinenteria followed its regular course, without presenting any other symptoms than considerable weakness accompanied by very moderate fever and diarrhœa, till the 18th October, the twelfth day of the attack, when profuse intestinal hæmorrhage occurred: she nearly filled a chamber-pot with blood, which was black, fluid, and very fœtid. The hæmorrhage recurred next day, when the discharged blood was similar to that passed on the first occasion; and on the following day, the stools were still black and fœtid.

The general symptoms were not such as to occasion much alarm, and from that time they became sensibly less severe; from day to day the fever abated, and on the 17th November, the patient, having entirely recovered, left the hospital, a month after admission. It was a remarkable circumstance in this case, that notwithstanding the enormous quantity of blood lost on two occasions, the patient, who naturally had colour in her face, did not lose it, and did not seem to be weakened.

Last year, a man, aged 27, tall, of good constitution, but having a pale complexion and fair hair was admitted on the 10th of June, to bed No. 16, St. Agnes's ward. He had been ill for eleven days with putrid fever, the symptoms of which were well marked and severe. He had lately come to reside at Paris, where he was employed as a day-labourer. For a week he had been feeling languid, and complaining of violent headache, when, on the 7th June, he was obliged to keep his bed. The abdominal symptoms preponderated,

and were characterised by considerable tympanitic distension, and by profuse and frequent stools. There was high fever, delirium, and a very dry state of the tongue.

On the 23rd June—the 24th day of the dothinenteria—the patient had during the day three copious motions, consisting of liquid black blood mixed with some clots. Immediately after this hæmorrhage, I observed a marked improvement. In the evening, it was noted that the fever was moderate; that there was no abnormal heat of skin; that there was an appearance of greater comfort; and a desire for food. The tongue, however, continued foul and sticky, with its centre red and dry.

Next day, I found that the patient had had three ordinary diarrhœal stools since the hæmorrhage of the previous evening. The tongue was moist, without being red, and at its base, there was a thin yellowish white fur. The pulse, till then above 120, had come down to 80.

The patient, however, was suffering from an ecthymatous eruption, which from the first week of the fever had been out on the hips, back, and thighs. Over the sacrum, the pustules had become converted into large superficial sloughs, not involving the entire thickness of the dermis: their base was of a greyish hue. With a view to get rid of the complications occasioned by the contact of the affected parts with the urine and excrementitious matters, and from the pressure of the dorsal decubitus, which the patient constantly maintained, it occurred to me to make him lie on straw covered only by a sheet, a practice adopted at the Salpetrière with the *gâteuses* to prevent excoriations of the seat. In accordance with my usual plan, the patient had taken nourishing diet throughout his attack: and now the quantity of broth was increased. The sloughs cicatrised, such of the pustules of ecthyma as had not ulcerated dried up, and the general condition of the patient was satisfactory, when on the 26th, a new intestinal hæmorrhage supervened, complicated with epistaxis and an efflux of venous blood through the mouth from the nasal fossæ. Notwithstanding this new complication, convalescence was speedily and satisfactorily completed, the patient being soon able to leave the hospital.

These cases are conclusive. I could add others, likewise derived from my own practice, as well as others observed by physicians of recognised eminence. Thus Dr. Ragaine of Mortagne, states that in four hundred cases which he saw, eleven had intestinal hæmorrhage,

and all the eleven recovered.[1] Very recently, Dr. Juteau of Chartres read, before the Medical Society of Eure-et-Loir, a very interesting paper on an epidemic of dothinenteric fever, in which he stated that five of his patients had had intestinal hæmorrhage, and that all of them recovered.

I would not wish, however, to be represented as saying that these hæmorrhagic complications, hitherto looked on as always serious, are really quite free from danger. They are in too many cases exceedingly serious. The hæmorrhage may by its profusion destroy the patient, just like any other loss of blood; and you have heard of death resulting from intractable epistaxis. Intestinal hæmorrhages, are also formidable, when, by recurring they exhaust the patient and cause him to fall into a state of anæmia and debility, leading to extinction of vital power, and ataxic nervous symptoms such as occurred in one of the three cases I mentioned. Finally, intestinal hæmorrhages really are serious complications of typhoid fever, when, occurring along with bleeding from the nose, gums, lungs, urethra, or along with sub-cutaneous hæmorrhage, they are symptomatic of a dyscrasia against which the resources of art are powerless. I am now speaking of the hæmorrhages which constitute one of the characteristics of the disease to which our predecessors gave the name of "putrid fever" as a distinctive term, and which at present we call "hæmorrhagic putrid fever;" but in these cases it is not, strictly speaking, the loss of blood which kills: death is the result of the peculiar morbid condition which constitutes putridity.

We had very recently, in our St. Bernard ward, bed No. 5, an example of this hæmorrhagic putrid fever.

The patient was a woman aged 22. She stated that she had always enjoyed good health; and that she had been confined four months previously. She had been ill for five days; and a short time before her seizure she had menstruated as usual. Her illness began with headache, vertigo, singing in the ears, accompanied by obvious deafness and fever. All these symptoms were present when I first saw the patient. The skin was hot, and the pulse 108. The patient complained of general lassitude, pains in the limbs particularly in the legs, and rachialgia. She also complained of pain in the throat,

[1] Ragaine:—Mémoire sur une Epidémie de Fièvre Typhoïde qui régna à Moulins-la-Marche pendant les années 1855, 1856.

but nothing particular was visible there. The tongue was very foul. There was a little cough, accompanied by the expectoration of stringy mucus. The patient complained that she could not sleep; and she had disturbed reveries. When spoken to, however, she answered questions with precision. In connection with the digestive organs, the symptoms observed were nausea and constipation. I prescribed 5 centigrammes of calomel, to be followed in a quarter of an hour by one gramme of the powder of jalap.

During the night, there was noisy delirium mingled with speaking and laughing. There was no expression of hebetude in the countenance: there was not much fever, and the skin was moderately hot: the tongue was red, and covered at the base with a very thick slimy fur. On drawing the nail lightly across the skin of the forehead, abdomen, and arms, I observed that the "*tache cérébrale*" was very distinctly produced, and that it remained for some time. I prescribed calomel in small doses, viz., 5 centigrammes divided into ten portions, of which one was to be taken every hour.

On the third day after admission, and the eighth of the disease, the delirium was less violent, and the patient answered questions. The *tache cérébrale* was very obvious, and remained for a long time: the bowels were sluggish: the pulse was 108: the gums were bleeding. The treatment of the previous evening was continued.

Next day, there was still delirium and deafness. The pulse was rapid and very soft. Diarrhœa was still absent. There were some rosy lenticular spots on the abdomen. The gums continued to bleed; and on causing the patient to lie on her face, we saw large ecchymoses on the posterior surface of the body, particularly on the trunk and arms: they were also seen on the anterior aspect of the chest, round the left breast. The ecchymotic spots were prominent in their centres.

On auscultation, some sub-crepitant râles were heard on both sides, and a blowing sound over the right infra-spinous fossa. I ordered four grammes of the powder of cinchona, to be taken in infusion of coffee: also, a mixture of four grammes of eau de Rabel, four grammes of syrup of rhatany, and 100 grammes of water—to be taken in doses of a dessert-spoonful. For diet-drinks, iced Seltzer water and iced milk were prescribed. The excitement and delirium continued; and diarrhœa supervened. The abdomen was not tympanitic. The thoracic complications increased. The breathing was loud; and the blowing sound, still audible in the

right infra-spinous fossa, was also heard at the base of the left lung. I substituted a gramme of sulphate of quinine for the cinchona, the same formula for its administration being adhered to.

On the eleventh day of the disease, the woman died. The cerebral symptoms continued till the last. The chest symptoms had increased, the blowing sound being audible from base to apex in both lungs. The dyspnœa had become intense, the inspirations being fifty-six in the minute. The pulse was 136. Blood was flowing from the mouth.

The autopsy was made on the following day. We found no trace of hæmorrhage in the intestines. In the lower portion of the ileum, three of Peyer's patches were softened, but not ulcerated. Some of the solitary glands were turgid. The mesenteric glands were congested, and of a rosy colour. The spleen was enlarged, and in colour was deep-red, like the lees of wine: its parenchyma was pulpy. The liver was soft. The posterior portion of the lower lobes of both lungs was the seat of apoplectic engorgement: the pulmonary tissue was soft and blackish. The membranes of the brain were only slightly injected.

What is the mechanism by which intestinal hæmorrhages take place in putrid fever? At the autopsy of persons who have died of dothinenteria we often find bare mesenteric vessels at the bottom of the intestinal ulcerations. Hence it might be supposed, that these hæmorrhages are attributable to the rupture of a mesenteric vessel during the process by which the furuncular core is eliminated. Still, for the most part, if not always, this is not what occurs. The blood is exuded by the mucous surface, exactly as it is in hematemasis and epistaxis, as well as in many other similar circumstances. The immediate cause of this sanguineous exhalation is an essential change in the blood, which is in a dissolved state, a fact you can verify by examining the blood abstracted from patients in our hospital wards which are under the charge of physicians who have recourse to bloodletting in the treatment of typhoid fever. Such of you as have attended the excellent clinical lectures of my honourable and very accomplished colleague Professor Bouillaud, the most ardent advocate of this antiphlogistic method of treatment, are aware that the blood drawn in such cases from a vein, or obtained by cupping, presents a fluidity very different from that taken in acute inflammatory diseases such as pneumonia and acute articular rheumatism. This particular condition of the blood, seen in a

very high degree in the hæmorrhagic putrid fever, (a case of which I have just detailed to you), this decomposition of the blood is also met with in other fevers, for example, in yellow fever, that singular malady in which hæmorrhages from the stomach and bowels are so pathognomonic, that in some regions of South America, and in the Antilles, where the disease is endemic, its common name is *vomito negro* or black vomit. In scarlatina, diphtheria, measles, and small-pox, the blood is generally in this dissolved state, and to it are attributable the intestinal, renal, and nasal hæmorrhages met with in them, and of which I mentioned cases when treating of these diseases. Neither in these diseases nor in yellow fever are there intestinal ulcerations to which we can attribute the hæmorrhages. Still, we can understand how the intestinal lesions of dothinenteria may favour the tendency to exudation of blood, just as in hæmorrhagic small-pox, measles, and scarlatina, or in diphtheria, an excoriation of the nasal mucous membrane may favour the production of epistaxis, or a surface denuded by a blister may more readily become the seat of cutaneous hæmorrhage.

So far is ulceration of the intestine from being a condition essential to the production of hæmorrhages, that they often come on at a period of the disease very far removed from that to which ulceration belongs.

Four years ago, I was sent for to meet Dr. Olliffe in consultation, in the case of a young English woman who had been seized with intestinal hæmorrhage. In this patient, the hæmorrhage occurred at the ninth day of putrid fever, a period at which the existence of ulcers was very improbable, as they are seldom formed till the fourteenth, fifteenth, or sixteenth day. The hæmorrhage continued for two days, and was so great as to cause extreme anæmia. On the fourteenth day of the disease, however, an obvious improvement took place in the patient's general state, and in seven days afterwards, she had completely recovered from the typhoid fever. All that remained of her attack was the anæmia consecutive on excessive loss of blood.

I have asked myself whether the influence of a prevailing "medical constitution" might not sometimes explain the occurrence of these hæmorrhages. Some years ago, I was meeting with them in typhoid fever, and at the same time was also meeting with passive hæmorrhages in other diseases:—I had at that time cases of purpura hæmorrhagica, black small-pox, and numerous examples of the

petechial scarlatiniform eruptions, which I have pointed out to you as occurring at the beginning of varioloid affections.

You have seen me treat intestinal hæmorrhages with preparations of rhatany and sulphuric acid. I generally prescribe a mixture of four grammes of eau de Rabel, forty grammes of syrup of rhatany, and one hundred grammes of water, ordering it to be taken during the day in doses of a tablespoonful. To prevent a recurrence of the hæmorrhage, I rely on cinchona: I prescribe four grammes of the powder of yellow cinchona to be taken daily in a small cup of coffee without milk. As a means of arresting the flux, this remedy certainly does not produce a sufficiently rapid effect; but for correcting the disposition to a recurrence, cinchona in powder is undeniably efficacious. Essence of turpentine has also been lauded by Graves in the treatment of these hæmorrhages.

Granular and Waxy Degeneration of the Striated Muscles in Typhoid Fever.—Nature and Consequences of this Degeneration.—Special Course of the Rise and Fall of Temperature in Typhoid Fever: this is Characteristic.—Parallelism between the Course of Temperature and the Evolution of the Intestinal Lesions.

A distinguished anatomist, Professor Zenker, when the prosector of my friend Dr. Walther of Dresden, discovered the existence of interesting anatomical lesions in typhoid fever—granular and waxy degeneration of the striated muscles.[1] Rokitansky had previously examined very thoroughly the subject of the fatty variety of granular degeneration: Virchow afterwards gave a very exact description of waxy degeneration which he regarded as connected with myositis, and he explained by this secondary alteration the rupture of muscular fibres observed most frequently in cases of typhoid fever: but Dr. Zenker has studied with the greatest care, and upon a considerable number of subjects, the different phases of the alterations which take place in muscles in typhoid fever. You must remember that this kind of degeneration is not peculiar to typhoid fever: it has been observed in several other diseases. Without inquiring what it may be in the

[1] Zenker: Sur les Altérations des Muscles Volontaires dans la Fièvre Typhoïde. [Archives Générales de Médicine, 1866.] I am indebted to this work for most of the details which I give above on the degeneration of muscles n typhoid fever.

abstract, let us now describe what has been observed in relation to it in dothinenteria.

In typhoid fever, different groups of striated muscles are subject to degeneration, variable in intensity and extension, but not less constant than the characteristic dothinenteric lesions of the mucous membrane of the intestines. This degeneration is either granular or waxy.

Granular degeneration, when examined with the aid of the microscope, is found to be characterised by a deposit of extremely minute molecules in the contractile tissue of the muscular bundles. This induces very great fragility in that tissue, so that during life, muscular contraction may cause rupture of the affected fasciculi.

In waxy degeneration, the contractile tissue of the primary muscular fasciculi is transformed into a colourless and perfectly homogeneous mass, presenting a very decided waxy lustre. The transverse striæ and the nuclei have entirely disappeared, and the sarcolemma remains intact as in granular degeneration. The waxy looking substance is a protean body, resulting probably from a transformation of the fibrin or syntonin. The altered fasciculi are always found to have acquired increased volume, and are sometimes twice their natural diameter. As in granular degeneration, they are found to have become exceedingly fragile, and to be the seat of numerous transverse fissures.

In addition to the rupture of muscular fibres, the rupture of vessels may likewise occur, as a consequence of granular or waxy degeneration: and this leads to small ecchymoses, or infiltrations of blood, more or less extensive in proportion to the thickness of the altered muscle, and the diameter of the ruptured vessel. These hæmorrhages occur most frequently in the second or third week of the disease.

Suppuration is a sequel of muscular degeneration which occurs much more rarely than rupture of vessels. But it would appear that degeneration of the contractile tissue is not always the cause of the suppuration, which latter may be the result of irritation seated in the perimysium (or envelope of the primary fasciculi). It is, therefore, the perimysium which would suppurate. Generally, there is only cellular proliferation of the perimysium, that hyperplasia being limited to the work of muscular regeneration: but there may be a greater amount of local irritation, so as to cause the limits of

normal hyperplasia to be exceeded, in which case there will be more cells formed than can advance through the stages required for their becoming contractile tissue: the cells which are in excess will therefore be devoted to destruction, and be transformed into pus. This is the histological explanation of the inflammation, and subsequent suppuration of, the muscular tissue.

The association in the same muscle of granular and waxy degeneration, according to Dr. Zenker, does not prove that the waxy, which is the more serious of the two, is the ultimate result of the granular. From their very commencement, the two forms of degeneration are distinct from each other.

To the naked eye, the following are the appearances which altered muscles present:—they seem perfectly intact, when the degeneration is but little advanced, which explains how this condition escaped notice prior to the employment of the microscope: when the lesion is greater, there is a very apparent change of colour, and in proportion as the degeneration increases, the discolouration becomes more decided: the muscles have at first a rose-grey tint which, becoming gradually paler, is finally yellowish grey, with sometimes a very slightly reddish or brownish colour. The discolouration proceeds by small spots or lines corresponding to the points where there is degeneration. When cut into, the altered muscles present an appearance resembling the flesh of fish.

During the first phases of the degeneration—the second and third week of the dothinenteria—the affected muscles are in general very tense, smooth on the surface, and in their substance dry, friable, and easily torn. They are increased in bulk, which arises from the thickening of the degenerated primary fasciculi. In the more advanced stages of the degeneration the muscles are relaxed, the surfaces of a section often present a humid aspect, and there is even sometimes more or less infiltration of serum not only into the muscle, but also into the loose cellular tissue which surrounds it, there being no similar infiltration in other parts of the body—a circumstance which proves that it is the result of the morbid changes in the muscle. My friend Mr. Walther has frequently seen on the living subject, over the recti muscles of the abdomen, a slight œdema corresponding to the lesion I have been describing, and recognisable by making strong pressure upon the part with the finger. I confess to you that I have not been so fortunate as to find this appearance.

According to Professor Zenker, muscular degeneration always

occurs in typhoid fever: in every autopsy he has found it, when he looked for it. The waxy is much more common than the granular alteration: Professor Zenker met with the former seventy and the latter only nine times.

The process of degeneration is generally at its height towards the end of the second week, from which it may be inferred that alteration commences as early as the disease itself. It continues with undiminished intensity during the third and fourth week. It is about this period that absorption of the detritus of the altered muscular tissue seems to take place: this leads to softening of the muscles, often accompanied by serous infiltration, and the possibility of observing, like M. Walther, a little œdema during life.

These details in pathological anatomy are too full of interest, for me to refrain from making you acquainted with them. The constancy of the occurrence of muscular degeneration in typhoid fever proves that it is an integral part of the disease, and the generalization of the lesion shows that it is not the accidental result of a morbid action exclusively local, but the expression of a general disturbance of the economy: the muscular system is attacked, just as the other systems are attacked.

Here again, however, gentlemen, I much fear that a consequence has been mistaken for a cause. It is evident that the weakness and disorder of the locomotive functions which cause the patient to totter from the very beginning of an attack of dothinenteria cannot be due to muscular degeneration, inasmuch as it does not then exist, or at least has only begun. The functional disturbance is caused by the morbid state of the cerebro-spinal system. The general disturbance of all the functions, and the special disturbance of the muscular system, which we see in dothinenteric patients arise from imperfect innervation. It is at a later stage of the disease that granular and waxy degeneration of muscles is produced by alterations in nutrition, consequences of disordered circulation. Disorder of the circulation produces hyperæmia everywhere, and everywhere consecutively, either pseudo-inflammations, (long ago described,) or the forms of degeneration upon which I have been addressing you. It is, then, in a somewhat advanced period, and particularly during convalescence, that the granular and waxy degeneration of the muscles affords a physical explanation of the feebleness which is felt. Besides, I cannot refrain from remarking that the degeneration affects in the greatest degree the recti muscles of the abdomen and the

adductors of the thighs, which certainly are not the principal muscular performers in the act of locomotion. We must therefore, while we record as interesting the anatomical details which I have given you, seek elsewhere for the cause of the long continued feebleness of dothinenteria: the cause is exhaustion—exhaustion from the morbid poison which produced the fever—exhaustion from every kind of affection of the nervous system, such as sleeplessness, delirium and convulsions—exhaustion from diarrhœa—exhaustion from suppuration in the situation of the sloughs—exhaustion from embarrassment in sanguification—exhaustion, finally, from inanition. Is there not in this more than enough to account for the feebleness, without requiring to seek an explanation of it in the partial alteration of the muscles? And do you not agree with me in thinking that it amounts to a sort of trifling to give or to accept such an explanation?

Gentlemen, I am now going to give you an account of the valuable clinical information which the thermometer furnishes in dothinenteria. At the beginning of this fever the temperature rises slowly, just as the symptoms are slow in developing themselves. During the first three, four, or five days, the temperature is from eight tenths of a degree to one degree higher than on the previous evening, while on each succeeding morning there is a slight remission of about five tenths of a degree from the temperature of the previous evening. Thus, in each twenty-four hours, there is observed an increase of temperature both in the morning and evening, as compared with the morning and evening of the preceding day, although there is every twelve hours a slight remission in the morning, as compared with the temperature of the preceding evening. Here is a table exhibiting this movement of temperature, as it occurred in one of our patients during the first four days:—

Day of the disease.	Morning.	Evening.	Exacerbation between morning and evening.	Remission between evening and morning.	Rise between mornings.	Rise between evenings.
	Degrees.	Degrees.	Degrees.	Degrees.	Degrees.	Degrees.
First . .	37.	38.2	1.2			
Second .	37.8	39.2	1.4	0.4	0.8	1.
Third .	38.4	39.8	1.4	0.8	0.6	0.6
Fourth .	39.4	40.4	1.	0.4	1.	0.6
			5.	1.6		

Definitive elevation of temperature up to the evening of the fourth day 3°.4.

This table drawn up by my *chef de clinique*, M. Peter, shows you at a glance the progressive ascent of the temperature, which, although there was a daily remission every morning from the temperature of the previous evening, had a positive increase every twenty-four hours both morning and evening. You will also observe from the table, that if the temperature had always remained in the morning at the point at which it was on the preceding evening, there would have been at the end of the fourth day a definitive elevation of five degrees, but as it fell every morning, the actual increase was only 3°.4 over the temperature of the first day. The table also shows you, that on the evenings of the third and fourth days, the temperature was oscillating at about 40 degrees, that is to say, between 39°.8 and 40°.4. This is about the usual temperature at that period; and for a long time the average of the evening exacerbation is 39°.5. From these facts, which were first ascertained by Thierfelder the following conclusions have been deduced by Wunderlich:—*When the temperature is* 40° *from the first or second day of the attack, the disease is not typhoid fever:* and again:—*When by the evening of the fourth day, the temperature has not attained* 39°.5, *the disease is not typhoid fever.*

Need I, gentlemen, insist upon the clinical importance of these statements? With their assistance you can from the very first make a differential diagnosis between dothinenteria, ephemeral fever, and an eruptive fever, such for example as scarlatina, and at the fifth day of a case hitherto doubtful, you will be furnished with data for stating that it is not dothinenteria. Let me give you the proof of this statement, derived from an excellent little work by Dr. Ladame of Neuchâtel, from which I have taken numerous extracts:—

"At the beginning of January 1864," says this young physician, "I was appointed to take the place of one of the *internes* of Professor Griesinger who had charge of the typhoid fever patients in the building set apart for contagious diseases in the cantonal hospital of Zurich. The cases at that time were very severe and numerous, and the student whose post I took was ill of the fever, which he had contracted by contagion. When I had been but a few days on duty in the fever wards, I was seized one morning, during the clinical lecture, with slight shivering, great prostration of strength, anorexia, and violent headache. I went to bed under the conviction that I was at the commencement of an attack of typhoid fever. In

the evening I took my temperature. The thermometer rose to 40 degrees! Notwithstanding the high fever from which I suffered, I was quite tranquillised as to my state. Next morning, convalescence began. The only treatment I had was low diet, cooling drinks, and one centigramme and a half of acetate of morphia."[1]

I have just told you that in our patient the temperature gradually rose during the first four days of the first week. In the three last days of the same week, it was 40°.6 in the evening, and fell between six and eight tenths of a degree in the morning. This is what generally takes place in the second half of the first week: the evening temperature keeps up to at least 39°.5, and usually to 40° or more, the morning temperature, according to the researches of Wunderlich, always remaining half a degree lower. Hence you perceive, that if you are called to a patient who has been confined to bed for some days, and has symptoms which lead you to suspect dothinenteria, you can decide that it is not that disease if the thermometer does not indicate an evening temperature of 39°.5, or if it on any one morning show the normal temperature of 37°.

At the end of the first stage, that is to say of the first week, the temperature has reached the point at which it will remain during the whole course of the fever. It oscillates about 39°.5, which it rarely exceeds in the evening, and in mild cases almost never attains in the morning. In some severe cases, the temperature exceeds 39°.6 in the morning as well as in the evening.

I have hitherto spoken of the diagnostic indications furnished by the thermometer. I now proceed to speak of it as a guide to prognosis. According to Wunderlich and Ladame, it is during the second week that one can best prognosticate the course of the disease from thermometrical observations.

1. If the evening temperature is maintained between 39°.5 and 40°, and the morning temperature remain always from half a degree to a degree lower than that of the previous evening, the attack will probably be mild, and convalescence begin about the third or fourth week, particularly if the temperature commence to fall a little between the eleventh and fourteenth days.

2. When during the second week, the temperature of the morning is maintained at 39° or 39°.5, and when the evening temperature reaches or exceeds 40°.5, without any commencement of a dimi-

[1] Paul Ladame :—Le Thermomètre au Lit du Malade. Neuchâtel: 1866.

nution of heat being observable by the middle of that week, there is a certainty that convalescence will, at the soonest, not begin before the fourth week.

3. All irregularities of temperature occurring during the second week demand attention.

4. Even when the temperature does not rise above 40°, the absence of a remission during the latter half of the second week, or an increase of temperature toward the end of that week, are always unfavourable signs.

5. The case is very serious, when the temperature is at 40° or more in the morning, and 41° or more in the evening; or when, towards the end of the second week, the temperature goes on increasing. Speaking generally, it may be stated that a temperature of 41° is not often met with, and in general only in cases which terminate in death. Mark the great prognostic value of this figure! A temperature of 41°.5 or 42° indicates inevitable death. The prognosis is also unfavourable when the morning temperature reaches or exceeds 40° for several days in succession.

Let me here notice, in relation to prognosis, this very high temperature, and extreme frequency of pulse. Dothinenteria is not a disease in which the pulse is very frequent, the normal range being from 100 to 110. When it gets up to or above 120 in an adult suffering from this fever, the prognosis is as unfavourable as when the temperature reaches or exceeds 41°.

6. From the commencement of the third week, the mild and serious cases can be distinguished from each other with the greatest precision. In the mild cases, there are great remissions of heat in the morning, the morning temperature being a degree and a half or even two degrees lower than that of the previous evening. During this week, the morning temperature becomes normal, and the evening temperature likewise goes on falling rapidly, but does not reach the normal standard till about the middle of the fourth week. In bad cases, on the other hand, the temperature remains what it was during the second week; and it is only at the end of the third, or beginning of the fourth week, that great remissions of temperature take place.

7. Defervescence never proceeds so rapidly as in exanthematous typhus.[1] It takes place in different ways. The most usual manner

[1] See the Lecture on TYPHUS in this volume.

is by the temperature beginning to fall considerably in the morning, even when, as I have just said, the evening exacerbations continue the same for some days; thus you may have, I repeat, a normal heat in the morning, while the evening temperature may still be 39° or even 40°. At other times, defervescence goes on in a regular and parallel manner, morning and evening, during a period of eight or ten days.

8. Convalescence may be said to have begun, when the evening temperature has returned to its natural standard of 37°.

9. The temperature generally rises at the time of death, or a few hours before it. Drs. Thomas and Ladé found the temperature as follows immediately before death in fourteen cases:—

Five times,	from 40°.25	to 40°.70.
Twice,	„ 41°.12	„ 41°.25.
Seven times,	„ 42°	„ 42°.75.[1]

In seven of the cases, therefore, the temperature reached or exceeded 42°, a temperature which according to Wunderlich is *hyperpyretic*, and only met with in cases which terminate in death. Under such circumstances, there is almost always a predominance of nervous symptoms, such as furious delirium, excessive restlessness, exhaustion, and paralysis.

Nevertheless, in contrast to these cases, I ought to tell you that there are others in which the temperature is normal, or very low. The pulse is at the same time small and very frequent: the skin is covered with a cold sweat: the extremities are livid: and in a word, the patient dies in a collapse, which is sometimes preceded by hæmorrhage.

Finally, there are cases in which death takes place although the temperature has neither been very high nor very low: the patients die exhausted after a profuse and obstinate diarrhœa, accompanied by tympanites, and nervous symptoms of no very great severity.

The thermal condition and the intestinal lesions follow an almost strictly parallel course. You will remember I told you that the alteration in the glands of Peyer and in the solitary glands begins on the fourth or fifth day; and I have now to say, that it is from the same period that the temperature rises definitively to somewhere

[1] A. Ladé:—Recherches sur la Température dans les Maladies. Genève: 1866.

about 39°.5 or 40°. There is, therefore, you see, a parallelism between the two phenomena. I have also told you that in mild cases the lesion of the Peyerian patches may be proceeding towards resolution: now, in mild cases, it is precisely at this time—about the middle of the second week—that we observe the great morning remissions of temperature. The parallelism continues: at the end of the third week, resolution of the Peyerian patches may be complete; and that is the period at which the evening temperature becomes normal. I also told you that in the most severe cases, resolution proceeded in certain patches, whilst others increased in size, and became more and more affected; so that in this way, the intestinal lesion continued till the third or even fourth week; and we have just seen that in severe cases defervescence does not begin till that period: here again is parallelism.

To sum up: In the *first period*, or the period during which the intestinal lesions are formed and developed, and which extends from the first day of the attack to the second half of the second week, the fever is continued or slightly remittent, that is to say, that in the morning and evening the temperature is febrile: in the *second period*, or period of resolution, embracing the third week and more, the fever is intermittent, that is to say, the temperature is febrile in the evening, and normal in the morning. During convalescence, there is no fever, and the temperature is either normal or low both in the morning and evening. Finally, to give a general idea of the thermal movement in typhoid fever, it may be said that there is a slow and gradual upward movement of the curve from the beginning of the disease; then a state, nearly stationary, in which there is only a slight morning descent; after which comes a regular but a slow defervescence.

In conclusion let me add, that when defervescence does not take place at its proper time, or when the temperature rises at the time at which defervescence ought to begin, there is a complication for which, if its nature is not evident from the symptoms, you ought carefully to search. There again, gentlemen, the thermometer may assist you in dealing with an insidious affection.[1]

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[1] Alf. Duclos:—Quelques Recherches sur l'état de la Température dans les Maladies. Paris, 1864.

Hirtz:—Article "Chaleur" dans le Dictionnaire de Médecine et de Chirurgie Pratiques, T. vi. Paris, 1867.

Rosy Lenticular Spots.—Successive Eruptions.—Miliary Eruption.—Blue Spots.

I have already said, gentlemen, that while I disagree entirely from those authors who hold that the rosy lenticular spots constitute the specially characteristic eruption of dothinenteria, and who look on the intestinal lesion as a secondary affection, I do not the less admit that the cutaneous eruption is of very great importance in the symptomatology of the disease.

The slightly prominent rosy papules, which disappear under the pressure of the finger, do not begin to show themselves till from the seventh to the tenth day of the fever, and it is not unusual for their appearance to be even longer delayed; but when this delay occurs, the general symptoms, which till then have been very mild, become strongly marked. It was so in the case of a young man in St. Agnes's ward, who after having shown us no symptoms for fourteen days, except a little prostration without fever, and a slightly saburral tongue, was, at that period of the attack, and coincidently with the appearance of the cutaneous typhoid eruption on the abdomen, seized with symptoms of the most serious character. There are also cases in which the cutaneous eruption never appears during the whole course of the disease, a fact to which I have already called your attention, by mentioning that in some epidemics of certain departments in France, it had not been met with.

This eruption does not come all out on the skin at once, as is the rule in the exanthematous fevers. Some papules first show themselves: on following days others consecutively appear. Each papule considered by itself has a duration of from three to fifteen days, and those which appear first are fading when new ones are coming out. The total duration of the whole eruptive period averages eight days, but it varies between the extreme terms of three days and twenty days.

Its profusion and prolonged duration generally coincide with an exceptional severity, or, to express it more correctly, with a greater prolongation of the disease. You have been frequently in a position to verify this statement for yourselves in numerous cases which have been brought under your notice. Thus, in two cases in which there was a total absence of the rosy lenticular spots, you saw recovery take place at the end of the third week, reckoning from the time at

which the patients were obliged to remain in bed, till the day on which convalescence was thoroughly established. This was also the duration of the illness in six other individuals who had the usual number of spots, but it was longer in eleven patients in whom you saw a very confluent eruption. The coincidence which I am pointing out, in the confluence of the spots and the severity of the disease, is never more evident than when the eruption after having disappeared comes out again once or several times. Simultaneously with the appearance of new spots, which are often more numerous than their predecessors, the general symptoms acquire new intensity.

A woman, aged nineteen, who occupied bed No. 25 of our St. Bernard ward, was attacked, eight days before admission, with headache, pain in the abdomen, and a feeling of general lassitude, prostration, and pains in the limbs. The abdomen was not tympanitic, but pressure caused gurgling in the right iliac fossa. The fever was rather moderate. Typhoid spots were visible when the patient was admitted into hospital: that first eruption disappeared, and a second showed itself on the eighteenth day, at a time when there had been an amelioration in the general symptoms for four days. Simultaneously with the second appearance of the spots, there was a renewal of the other symptoms in an aggravated form: the prostration was greater, the fever higher, and the diarrhœa more profuse than before. Five days later, the severity of the symptoms subsided: and on the twenty-seventh day from the beginning of the attack, the patient was quite convalescent, and five days afterwards was in a state to leave the hospital.

In the case which I am now going to relate, there were two reappearances of the cutaneous eruption. The patient was a young woman whom you saw occupying bed No. 30 in the same ward. When received into the Hôtel-Dieu, she had been ill fifteen days, and ten days confined to bed. She had all the symptoms of typhoid fever. We found numerous rosy spots. They had disappeared on the thirteenth day of the attack: next day, an improvement was observed, there being less diarrhœa, tympanites, and prostration. Three days later, the patient experienced nausea: there was a renewal of the abdominal tympanitic distension, and at the same time gurgling was perceived. There was high fever; and a new eruption as abundant as the former. The severity of the symptoms after a time abated. The spots were completely faded on the twenty-seventh

day; and on the thirtieth, convalescence seemed sufficiently secured to enable the patient to be allowed a little solid food; but, on the thirty-fourth day, there set in, for the third time, abdominal pains, gurgling, nausea, vomiting, and diarrhœa. The tongue was red, dry, and destitute of epidermis: the skin was hot; and the urine contained albumen, which coagulated on the application of heat. On the morrow, a new eruption of rosy spots appeared, which remained till the fortieth day of the disease; and on the forty-fifth day convalescence was definitively established.

In neither of these cases, could any cause be assigned for the severe relapse of the dothinenteria; but relapses are sometimes attributable to errors in diet, to a fit of indigestion, so difficult to guard against in self-willed patients.

This occurred in a third case in which there was a return of the symptoms. The patient occupied bed No. 5 of St. Bernard's ward. On the twenty-eighth day of her dothinenteria, this woman, who was entering upon her convalescence, had a fit of indigestion, and was very soon afterwards seized with delirium and fever. On the following day, an eruption of rosy spots—which had been observed since her admission to hospital and had disappeared—again came out. The relapse was not of long duration. The general symptoms abated: the spots had faded away in five days from the date of their reappearance, and by the end of the fifth week recovery was complete.

The existence of this exanthematous eruption at periods very remote from that before which it has generally disappeared, may sometimes lead to mistakes; and when one has not observed the disease from the beginning, when there is a want of precise information regarding the previous history of the case, the dothinenteria may be supposed to have reached a more advanced stage than it really has. An autopsy recently performed in your presence has a very interesting bearing on that point.

A man, aged thirty, was brought to the hospital with all the symptoms of very severe putrid fever. The delirium was violent, the fever intense, the skin hot and dry: the abdomen was tympanitic, and covered with a very confluent eruption of rosy lenticular spots. Although the persons who brought him to the hospital told us that he had been ill thirty-five days, the profuse eruption led us to believe, considering the general rule of the disease, that the typhoid fever dated back only sixteen or eighteen days. We inquired

whether the patient had not had some other malady before that under which he laboured at the time of his admission to the hospital. The patient died; and on opening the body, it was found that the typhoid fever really did date back to a period thirty-five days before we saw him. We found intestinal ulcerations nearly cicatrised. The eruption which he had on admission was therefore a second eruption.

To explain the intensified returns (*recrudescences*) of the fever and the successive eruptions, we must suppose that the morbid poison has not exhausted itself in the first outbreak, and that the economy, to get rid of it, requires repeated efforts. These returns of the fever are neither relapses (*rechutes*), nor still less are they new attacks (*récidives*): it is the same attack, the symptoms of which, temporarily interrupted, recur under the influence of the same morbid cause which produced them in the first instance. However complete the symptoms may be, and although the eruption reappears, the characteristic intestinal lesion never returns. In the patient whose case I have just brought before you, we only found cicatrised ulcerations: there was no trace of a renewal of the intestinal ulceration.

The possibility of the symptoms returning at a time when convalescence is supposed to have begun ought to make the physician very cautious. When at this period he thinks that he may feed up his patient, he ought to proceed with very great prudence, and avoid being guided by the appetite of the patient, which is often deceitful: he ought in particular to be exceedingly reserved in his prognosis during the whole course of dothinenteria, as cases which seem at first to be exceedingly mild, may one day have a very serious exacerbation. In reference to successive eruptions, I would say, that while they do not absolutely imply danger, they at least indicate that the case will be more protracted than usual, and consequently that recovery will be retarded.

I have still to mention two other forms of eruption to which I have often directed your attention at the bedside of the patient. I am not at present referring to *petechiæ*, those small spots of a violet-red colour which do not disappear under pressure of the finger, true sub-cutaneous ecchymoses which belong to the history of hæmorrhagic putrid fever, and still more to the history of typhus. I refer to the *miliary eruption* and the *blue spots*.

The transparent miliary vesicular eruption [*la miliaire pellucide*] improperly called *sudamina*, generally appears between the eleventh

and twentieth days and sometimes later, and consists of small blebs of round or oblong shape like tears, which are filled with a transparent fluid. This eruption is sometimes very profuse, but there is a great difference in respect of the number of blebs. The situations which it occupies are the abdomen, particularly in the vicinity of the groins, the front of the neck, and the anterior part of the axillæ: in some cases, it extends over the entire trunk, and also appears on the limbs. This eruption is hardly visible, unless you are very close to the patient, but it is easily recognisable by the touch, on account of the sort of rugosity of the skin caused by the small blotches of which it consists. It is never seen on the face. It is more usual to meet with this exanthem in typhoid fever than in any other disease, but it is by no means peculiar to it; and I agree with Huxham and Professor Bouillaud in regarding it as simply the symptom of a symptom, miliary eruption being generally the consequence of sweating.

You have seen in many patients an eruption of spots of a blue colour. These *blue spots*, you have remarked with me, are only seen in exceedingly mild cases terminating favourably. Is this a mere coincidence, or is the eruption of blue spots an inherent characteristic of a mild form of the disease? These are questions which I cannot solve.

Intestinal Dothinenteric Catarrh.—Its Specific Character.—Predominance of Intestinal and Pulmonary Catarrhal Affections constitutes the Forms of the Disease called "Abdominal" and "Thoracic."

We had, gentlemen, in bed No. 11 *ter* of St. Agnes's ward a youth who came into the Hôtel-Dieu five days ago with giddiness, headache, high continued fever, the tongue red at the point, thirst, anorexia, some fits of cough, and a profuse diarrhœa. At first, there was room for supposing the case to be one of incipient typhoid fever, and for a moment I did entertain that idea. The diarrhœa, however, had set in so suddenly, and had from the very first been so severe, that I hesitated: the symptoms seemed not to be those of the enteritis which accompanies putrid fever, but those rather of simple intestinal catarrh. I deferred my diagnosis; for it is especially necessary in such circumstances not to pronounce a too absolute opinion. In twenty-four hours, the fever had abated, and on

the third day it entirely ceased: the general symptoms likewise improved, the headache became less severe, the appetite returned, and with these changes for the better, the diarrhœa also stopped. In fact, this youth who, at the most, had been ill six days, had, at the end of these six days, regained his usual health.

I should certainly, gentlemen, have played a lucky game, if I had given at my first visit a decided opinion based upon the symptoms which were then present. If without allowing the case for a moment to follow its natural course, I had begun active treatment, in place of confining myself to prudent waiting, I might have believed, and I might have told you, that I had cured a case of dothinenteria in six days, as some physicians who do not take into account the specific character of the disease assert they can do, and as homœopaths particularly pretend to do. I should have deceived myself like these physicians, and like these homœopaths :—I speak of honest homœopaths, for it is necessary to distinguish between the honest and dishonest of that sect. Of the dishonest homœopaths, the great majority, grossly ignorant, and without any kind of medical creed, only see in homœopathy a road to riches, by attracting to themselves the public, always favourable to the mysterious; while others, still more culpable, shameless charlatans of the worst description, educated in our art, knowingly deceive themselves in deceiving their patients. But by the side of these dishonest men, thoroughly deserving of the contempt into which they have fallen, there are others, educated, conscientious, and convinced of the truth of the doctrine which they have embraced: it was to them only that I made allusion.

Well! when these practitioners fancy that they have arrested in their career maladies which must pursue an inevitable course, it is because they do not regard this inevitability from the same point of view with me. Let me explain myself by giving you an illustration of my meaning. We know before hand, when we inoculate small-pox or cow-pox, that the morbific germs will grow up and produce a disease, the characters of which will be rigorously determined by, and absolutely dependent upon, the nature of the cause whence they spring—as absolutely—the comparison is strictly correct—as absolutely as the germ of a plant grows up reproducing the characters of the species which furnished it, and of no other species, the acorn reproducing the oak, and the seed of corn reproducing corn. In disease, though we cannot lay hold of the first cause, the same thing

takes place, that is to say, different causes engender diseases of different species having respectively their special symptoms and peculiar career; and, to return to our subject, the morbific cause which engenders simple intestinal catarrh, will not engender the catarrhal enteritis of dothinenteria any more than the virus of small-pox will engender scarlatina: each has its own special characters and course, and I am not of those who believe that the one can be transformed into the other, unless it be under peculiar circumstances, as for example, when, under an epidemic influence, an individual seized originally with a simple intestinal catarrh is attacked with putrid fever, which then puts its stamp on the non-specific enteritis. To continue still farther our comparison derived from the germination of the seed, I would remark, that while it is difficult, even after long practice, to distinguish the different kinds of plants at the period when there is nothing to be seen but the nascent leaflets in the cotyledons of the seed, while we must wait till the formation of the plant is more advanced before we can tell the family, genus, species, and variety to which it belongs, it is also difficult to distinguish the particular disease with which one has to do, so long as it is only beginning to manifest itself. Hence the frequency with which simple intestinal catarrh is mistaken for the intestinal catarrh of dothinenteria; and the frequent necessity of allowing some days to elapse before pronouncing a decided diagnosis. It is, therefore, an immense point in medicine to know the natural course of diseases, and to wait a little till their characters are precisely drawn: before beginning treatment, it is necessary to know whether the case is one in which our intervention ought to be active, or one in which we ought to rely on the unaided therapeutic efforts of nature, satisfying ourselves by being always ready to assist nature should that be requisite.

The intestinal catarrh of dothinenteria is a catarrh of a specific character, and we may use means for moderating it, just as we adopt means for moderating other catarrhs; but if we try entirely to remove it, we shall fail. The diarrhœa which characterises it is one of the most frequent symptoms of the disease; but no more than the other symptoms is it proportionate to the extent or intensity of the intestinal lesions. It may set in during the first twenty-four hours, or not till the third day, the ninth day, or even not till a more advanced period; and in some exceptional cases, the intestinal flux is absent, and sometimes even there is obstinate constipation during

the whole course of typhoid fever. You have seen several examples of this in the clinical wards.

In the generality of cases, the stools are few and scanty at the beginning of the attack, and vary during the remainder of its course in number and character. Sometimes a patient has only one in twenty-four hours, while another patient has more than twenty. The evacuations are liquid, yellowish, greenish, or sometimes they consist of a stercoraceous pulp, or they have a semi-liquid consistence: their odour is fetid, and *sui generis*. The motions are seldom accompanied by severe pain, and never or almost never with gripes: they may be passed involuntarily, as when the patient is in a state of delirium or stupor, and likewise when he is in no such circumstances.

The catarrhal feature of the disease is also met with in the pulmonary apparatus, where auscultation always reveals a certain amount of bronchitis characterised by dry, moist, sibilant, and mucous râles, which are heard from the beginning or at least from the first days of the attack. The cough is generally in proportion to the abundance of the râles: the expectoration, which is exceedingly small in quantity, consists of mucous sputa.

The catarrhal affections do not always coexist; and when the abdominal symptoms occur alone, or when they dominate over the other symptoms, "*abdominal*" is the name given to the form of the disease. It is chiefly in the mucous form of dothinenteria that we meet with this almost exclusively abdominal character in the symptoms.

Thoracic complications, whatever may be the leading general symptoms, may assume great intensity, and then there may be either an exacerbation of the ordinary bronchial catarrh, or inflammation of the pulmonary parenchyma: the existence of pneumonia is ascertained by hearing fine crepitant râles and bronchial blowing on auscultation, and by dullness on percussion over the affected part. On examination after death, the lung is found to be highly congested, and hepatised, and to tear in handling, a condition which I remarked in the case of the young lad of St. Agnes's ward, the particulars of which I will afterwards recapitulate. This pneumonia occurring in the course of typhoid fever is one of the most serious complications: it very greatly imperils the patient, and when it does not lead to an immediately fatal issue, it prolongs and thwarts convalescence.

You saw to-day, in bed 28 of St. Bernard's ward, a woman presenting an example of what is called the thoracic form. But in her case, bronchial catarrh, without parenchymatous inflammation, is the leading symptom. The patient had bronchitis when she came into the Hôtel-Dieu on the 15th of August last. She has resided in Paris for the last two years: she has generally enjoyed good health. She was confined seven months ago, when, fifteen days before she came into our wards, she was seized with headache, abdominal pain, and slight diarrhœa. From that time, she was distressed by sleeplessness. When we saw her for the first time, she had a copious eruption of rosy lenticular spots. The circumstance which especially attracted my attention was, that the chief complaint this woman made was of difficulty in her breathing, which was loud and quick. On percussion of the chest, we found that the sounds elicited were everywhere equally clear: on auscultation, we heard râles in every part of the chest—mucous râles which were coarse at the upper part, and finer at the base of the lungs. The fever was very moderate.

This patient is still in hospital, and in the report of her case, which is taken regularly day by day, you will see that her slight abdominal symptoms had subsided by the 19th of August, that by the 21st the stools had become natural, and the fever had left her: but that the pulmonary symptoms had improved very slowly. For some days, the expectoration has become more and more abundant, and has assumed a muco-purulent appearance: the plessimetric and stethoscopic signs remain as before, and there is no decrease in the dyspnœa. To-day, the thirty-second day of the disease, you see this woman still very much in the same state in respect of her bronchitis. You will find her seated on her bed, always suffering from oppressed respiration, and frequent fits of coughing. Her spittoon contains a large quantity of muco-purulent expectoration. The digestive functions, however, seem to have returned to their natural state, the appetite is restored, and she eats half the ordinary daily diet of a patient. There is very little feverishness.

Forms of Dothinenteria, viz.—the Mucous, Bilious, Inflammatory, Adynamic, Ataxic, Spinal, Cerebro-spinal, and Malignant.

A mason, aged sixteen, born in the department of Haute-Vienne,

and who had only been resident in Paris for a few months came into the Hôtel-Dieu on the 14th June, and was placed in St. Agnes's ward. When I saw him next morning, he could not give the least information as to the beginning of the malady from which he was suffering. He was in a state of high fever: the pulse was 100, regular, but soft. There was profound coma: he had been delirious during the whole night: and I observed convergent strabismus of both eyes. The tongue was red and dry; the abdomen was tympanitic, with gurgling in the right iliac fossa, and diarrhœa. The symptoms became more severe every day, and on the 17th, I noted that the limbs were rigid. On the 19th, five days after his admission to hospital, the patient died. On the morning of his death, his appearance was deplorable; the eyes were haggard: the nostrils, lips, and teeth were covered with black sordes: the tongue, dry and covered with little cracks, lay motionless between the upper and lower teeth: the abdomen was tympanitic: the pulse was thready, and exceedingly quick: the skin of the hands was cold, clammy, and blue as in cholera, while that of the body was dry and burning.

At the autopsy, we found great gaseous distension of the intestines: the glands of Peyer were swollen, but not ulcerated, some of them forming an elevation of the thickness of a five franc piece: some of the solitary glands were swollen: the mesenteric glands were enlarged. The spleen was hypertrophied, measuring seventeen centimeters in length and thirteen in breadth. Its tissue was easily reduced to a thin pulp. The liver, blackish and soft, broke down under the least pressure, making it difficult at first sight to distinguish its two component tissues. The lungs, black, gorged with blood, and softened, tore easily: they did not contain any apoplectic sanguinolent masses. The heart, pale, and anæmic, contained some clots. The membranes of the brain were only slightly vascular: there was neither opaline nor even discoloured effusion in the sulci: there was no thickening of the membranes, nor were they adherent to the substance of the brain. The brain when sliced presented only a slight appearance of bloody points.

Gentlemen, during the two months which preceded the occurrence of this case, you saw two other typhoid fever patients in whom the symptoms which predominated were similar to those which we met with in this young man. One was a man and the other a woman: both recovered. A month after leaving the Hôtel-Dieu, the woman

was received into La Pitié Hospital, having had a relapse. The man, aged eighteen, whose life was for a long time in danger, left our wards on the thirty-fourth day, completely recovered from the attack of typhoid fever, and also from sores over the sacrum which had formed during the severe period of his illness.

These are cases of *adynamic typhoid fever*, which our predecessors considered a distinct disease; just as the mucous, bilious, inflammatory, ataxic, and malignant forms were looked on as separate diseases till the progress of pathological anatomy, influenced mainly by the labours of Bretonneau, showed that they were not different species, but simply varieties of one species.

Nevertheless, in reducing all the varieties to a pathological unity, specially based on the constant existence of the dothinenteric eruption, it is impossible to deny that predominance of a certain class of phenomena gives a particular stamp to the dothinenteria, which it is important to take into consideration at the bed of the patient, in respect both of prognosis and treatment. Is not this predominance of particular pathological manifestations conspicuous in other diseases, upon which it, in the same way, impresses its own character? For example, does not pneumonia, generally an acutely inflammatory disease, become, under certain circumstances, bilious, adynamic, ataxic, or malignant? In consequence of dothinenteria having a greater tendency than any other disease to present variety of dominant symptomatic phases, the older physicians, unable to grasp the pathological unity of this variety, regarded each different form as a distinct disease.

The simplest form of dothinenteria is the *mucous:* it is distinguished from the others by its purely negative characters, there being no decided predominance of one or several symptoms. You have seen numerous examples of this form. To it belonged the cases in which the patients reached the hospital in a state of prostration approaching insensibility, complaining of a little headache, and feeling giddy. Some have had sleeplessness, and others slight delirium. The fever was moderate, and the pulse was often below the normal standard. You have sometimes observed epistaxis at the beginning of an attack: but it is generally absent, and the course of the disease is not influenced by its presence or absence.

You have seen that the leading symptoms are connected with the digestive functions. The patients complained of want of appetite, an insipid taste in the mouth, and rather urgent thirst. The tongue,

saburral to a slight degree, was covered with a thin whitish fur : it was moist, swollen, retained the impression of the teeth, and was red at the point and edges. In some cases, there was vomiting. Some patients had profuse bilious diarrhœa, while others had obstinate constipation. Gurgling in the right iliac fossa was always observed. Auscultation established the existence of bronchitis characterised by sibilant, sonorous, and mucous râles, with occasional fits of coughing accompanied by mucous expectoration. In some patients, the rosy lenticular spots were wanting, while in others, they came out in successive eruptions. This mucous fever is a mild form of dothinenteria, but nevertheless an attack may be prolonged for twenty, thirty days, or longer. I have always seen it terminate favourably ; but you must remember that in this mild form of the disease, as well as in the still milder cases to which the designation of *latent* typhoid fever has been given, death may occur from an unforeseen perforation, from hæmorrhage, or from one of those spontaneous attacks of peritonitis of which I have spoken. Convalescence is often very slow ; and when this has been the case, I have seen relapses which were worse than the original attack.

Under the prevailing influence of certain medical constitutions, the disease assumes the *bilious* form. Although this form has lately occurred pretty frequently in town, we have not met with any well-marked cases of it in the clinical wards. Gentlemen, you know the characteristics of the bilious form of dothinenteria. The saburral condition is more decided than in the mucous form. The complexion is yellow, particularly on the alæ of the nose, and in the naso-labial hollow : the sclerotic has an icteric hue : there is greater want of appetite than in the mucous form, and the patient complains of a very bitter taste in the mouth, accompanied by nausea, and vomiting of yellowish and greenish matters. The fur upon the tongue is thicker than in the mucous form of the disease, and has a greenish-yellow appearance, particularly at the base. There is also more headache. The bilious is generally combined with one of the other forms of which I am going to speak.

The *inflammatory* is likewise generally combined with other forms of the disease. It is characterised at the commencement of the attack by intense fever, a pulse which is full and often *bis feriens*, a moist heat of skin, and, in a word, with the symptoms of general febrile plethora. This inflammatory condition, which, according to the prevailing medical constitution, is frequently met with, rarely

continues from the beginning to the end of an attack: it usually gives place to an *adynamic* or *ataxic* state.

Except in this last form—this state of prostration—the collapse of the animal functions, particularly of muscular contractility, is one of the most constant generic characters in all the varieties of typhoid fever. When it is not in excess of its usual degree, it does not call for more anxious consideration than any other symptom; but when it becomes the predominating character of the attack, and when with the prostration of the functions of animal life, there is combined collapse of the organic functions more immediately essential to the maintenance of life, a condition exists to which is given the name of *adynamia*. This *adynamic* typhoid fever, of which I have brought under your notice several examples, was characterised in our patients by extreme softness of the pulse, by very deep and protracted stupor, by very great insomnia, by quiet delirium, by muttering, by picking the bed-clothes, by deafness, and by paralysis of the bladder requiring the use of the catheter. You recollect a woman who in her delirium refused to take food, and to whom it was necessary to administer soups by the œsophageal tube. In this form of the disease, the tongue is clammy, and trembling, and the tongue, gums, and teeth, are covered with black sordes. There is profuse diarrhœa, and an extreme degree of tympanites. In some epidemics intractable vomiting has been observed. In this form of the disease, you will observe that the perspiration, breath, and urine have a fœtid smell. There is a tendency to hæmorrhages; and also to sphacelus, as is indicated by sloughs forming in the seat, the heels, and over the great trochanters, caused by pressure, contact with excrementitious matters, and still more by the general condition of the patient. The symptoms which I have last mentioned—the very great fœtor of the breath, sweat, and urine, and the tendency to hæmorrhage and sphacelus—have been given as the characters of *putridity*, which must not be considered as quite the same with adynamia. This putridity is compatible with a high temperature, a turgid and very injected state of the skin and mucous membranes, a great increase of the pulse, and, in a word, with high fever; the *causus* of our predecessors was nothing else than this congestion, although true adynamia has as its leading characteristic a state of fever either suspended or notably below that which is absolutely indispensable for the complete and regular accomplishment of the long sequence of pathological operations of which the organism is the theatre.

The adynamic form of dothinenteria is serious, but less serious than the ataxic form, and medical treatment can often do a great deal to assist the failing powers of nature. The therapeutic indication is to excite reaction, and to fulfil that intention, stimulants and tonics are evidently the appropriate remedies.

Generous wines, and cinchona in various forms constitute the basis of the treatment. Stimulants such as ether and camphor, excitants such as ammonia and the acetate and carbonate of ammonia ought to be administered for the purpose of awaking—if I may use the expression—of awaking the organic powers, while tonics ought to be employed for maintaining them. As tonics auxiliary to cinchona, I may mention infusions of wormwood, serpentaria, anise, cascarilla, and all similar remedies. Malaga wine is preferable to other wines, whether French or Spanish: it may be given in spoonful doses every two hours, every hour, or even at shorter intervals, the quantity taken in the twenty-four hours being from 125 to 250 grammes. The ordinary tisane of the patient is a vinous lemonade with the addition of Seltzer water.

Cinchona is prescribed in the form of extract, in doses of from four to ten grammes, in draughts; or in the form of powder, in a cup of infusion of coffee without milk; or the sulphate of quinine may be ordered in doses of a gramme and upwards. As a beverage, a weak decoction of the bark sweetened with lemon syrup is employed. If the stomach does not tolerate this beverage, the decoction, with the addition of camphor, may be given as a lavement; or sulphate of quinine may be administered in the same manner, combined with musk, as in the following formula:—sulphate of quinine, from one to four grammes; sulphuric acid, enough to dissolve the sulphate; musk, two grammes; and water, a hundred grammes.

Fomentations of wine and camphorated alcohol are employed.

In the clinical wards, I have seen benefit result from placing the patient in a mustard-bath. Two kilogrammes of the flour of mustard, made into a soft paste with water, are tied up in a coarse cloth and put into the bath: the cloth is pressed sufficiently to give a yellow colour to the water.[1] Under the influence of such baths you have seen improvement take place, the general aspect

[1] The mustard generally used in France is a much feebler irritant than English mustard, so that in place of two kilogrammes (a little more than four pounds) it would be, perhaps, sufficient to employ two pounds of English mustard.—Translator.

becoming better, the pulse regaining volume and diminishing in frequency, the blueness of the extremities giving place to the natural colour of the skin, and the abdomen becoming softer. This treatment is repeated every twenty-four hours: it is not discontinued till, under its influence, the skin has regained its warmth, till the pulse has become firmer, and the senses, the motor apparatus, and the intellect, have emerged from their state of stupor and lethargy.

It is especially in this class of cases that we require to give nourishment to the patients in accordance with my plan: this is a cardinal point in the treatment of dothinenteria; but I will reserve what I have to say upon this subject till I come to discuss it in a special manner.

In the *ataxic* form of dothinenteria the symptoms are of an entirely different description. There is no prostration, nor collapse of the animal functions; but they are in a state of disorder, incoherence, and discord. When the ataxia involves the vital functions over which the sympathetic nervous system presides, and the active and constant exercise of which is essential to the continuance of life, we say that the form of the disease is *malignant*. We must not, however, confound malignity with ataxia, a term which embraces everything, and strictly speaking specifies nothing, for its application has been limited, as I now limit it, to the cases in which the co-relation of the animal functions is broken up. Ataxic typhoid fever, then, is characterised by disturbance of the nervous system: the cerebral symptoms consist in more or less violent delirium, accompanied by cries, vociferations, disturbed sleep, nightmare, hallucinations of every kind, convulsions, tetanic contraction of the limbs, strabismus, picking the bed-clothes, spasmodic jerking of the tendons, and sudden exaltation followed by as rapid a collapse of the muscular power. There is intense fever. The patient complains of excessive lassitude, cramps, very severe pains particularly in the lumbar region, and violent headache.

This is the most mortal of all the forms of dothinenteria: it destroys patients as if by a thunderbolt. We have seen it carry off in four days a young girl brought by it to our St. Bernard ward. Five days previously, she had been in perfect health. I am enabled by a special circumstance to fix with precision the date at which her attack commenced: she was present at the public fêtes given to celebrate the Emperor's marriage, and on the following day expe-

rienced the first symptoms of the disease from which she died. It began with violent pain in the head, and a state of insomnia disturbed by dreams and frightful nightmares. When brought to the Hôtel-Dieu, she complained of racking headache, accompanied by pains, which were dreadful in the limbs, and still more dreadful in the loins. The fever was intense; the pulse was very rapid; and the skin was burning, dry, and coloured. When this young woman was admitted into our wards, she was subjected to the cold affusion. From this she experienced a little temporary relief, but on the same evening she succumbed to the violence of the symptoms, which had never ceased for an instant.

The autopsy disclosed the existence of one of the most confluent dothinenteric eruptions which I ever saw; and it is a remarkable fact, that this was seen at the fifth day of the disease. In my early medical studies, I saw an exactly similar case in the practice of my illustrious master, Bretonneau, at the hospital of Tours.

The predominance of ataxic phenomena may sometimes depend on the nervous temperament of the patients, or on moral emotions experienced before or during the attack; but generally, it is dependent on the character of the epidemic, and the prevailing medical constitution.

Having now spoken of the symptoms referable to the brain, it is necessary that I should point out to you those to which dothinenteria gives rise in connection with the spinal marrow, to which the late Dr. Fritz, an observer of the greatest merit, has directed special attention.[1] I refer to lumbar pains, very similar to those which occur so often in small-pox, accompanied sometimes, but not so frequently as in that disease, by incomplete paralysis of the lower extremities, or more generally by cutaneous and muscular hyperæsthesia, and by lancinating pains in the extremities: there are also rachialgic pains of greater or less severity in the dorsal region, often a very intense pain in the neck, shooting to the occiput, impeding the movements of the head and neck, and sometimes causing, like the pains in the inferior extremities, a feeling of inconvenient stiffness in the muscles; and finally, there is acute sensibility to pressure made over the spinous processes of the vertebræ of the region of pain, thus indicating a true spinal hyperæsthesia.

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[1] G. Fritz:—Etude Clinique sur Divers Symptômes Spinaux dans la Fièvre Typhoïde. Paris: 1864.

These symptoms, which are almost never absent, generally continue till about the middle or end of the first week, and then disappear, just as happens in respect of the cerebral symptoms in a great many cases. But this is not the invariable course of events. And occasionally, just as cerebral disturbance is seen to be the predominating feature of an attack, so spinal symptoms may occupy the leading place in the symptomatology of dothienenteria, and continue to do so till the advanced phases of the malady.

But it is important to observe with Fritz, that even in cases in which the spinal symptoms have attained a very remarkable degree of severity, the autopsies, as well as the clinical observations during life, show that there was neither inflammation of the spinal marrow nor of its membranes accidentally complicating the typhoid fever. At the very utmost, it is only in an exceedingly limited number of cases, that one can in part attribute the spinal symptoms to congestion of the membranes of the spinal cord: generally, the cord and its coverings present no appreciable material lesion.

We may, therefore, admit with Fritz, that there is a *spinal* form of typhoid fever, when spinal symptoms predominate, just as we allow that there is a cerebral form when cerebral symptoms predominate. In the cases of which I speak, the complete series of spinal symptoms may be observed: thus, in respect of sensibility, and occupying the most important place, is cutaneous hyperæsthesia extending over a great part of the body, sometimes involving the four extremities, the trunk and the neck, and often accompanied by muscular hyperæsthesia; then there is hyperæsthesia extending from the atlas to the sacrum; then again there is, but not so frequently, rachialgia accompanied by shooting pains in different parts of the body, and suffering of almost unbearable severity in the superior, and occasionally, though not often, in the inferior extremities; also, pain in the loins; violent pains in the chest; bi-lateral and symmetrical neuralgic pains in the trunk; anomalous sensations of cold, formication, a feeling of pricking along the spine or in the limbs. Finally, along with this exaltation of the sensibility, we may have its extinction or perversion; for example, analgesia and anæsthesia of the skin, and muscular anæsthesia.

There is quite as much diversity in the disorders of the motor system: for example, we meet with paralytic symptoms, numbness of the extremities, paraplegia, partial paralysis of the respiratory muscles, constipation, retention of urine, paralysis of the sphincters, spas-

modic affections, dysuria from spasm, spasmodic contraction of the respiratory muscles and muscles of the extremities, stiffness of the muscles of the neck, contraction of the limbs, and even tetanic symptoms.

In conclusion, let me point out, with Fritz, a special group of symptoms having its origin in the medulla oblongata, such as extreme dyspnœa independent of any affection of the respiratory passages or muscles, spasm of the pharynx and larynx, convulsive cough, aphonia, alalia, inability to use the tongue in mastication, spasmodic or rythmic contraction of the sterno-mastoid and trapezius muscles, and paralysis of the pharynx.

The spinal symptoms of typhoid fever are often accompanied by cerebral, thoracic, and other symptoms of great severity. The concurrence of spinal with formidable cerebral symptoms constitutes the *cerebro-spinal* form of Wunderlich, which presents some difficulties in diagnosis.

It is not by chance or indifferently that the spinal symptoms show themselves: in children, in young women, and in anæmic subjects, the spinal marrow seems to be peculiarly liable to be seriously affected in dothinenteria.

Independently of the treatment which ought to be pursued, in accordance with indications of which I will speak when reviewing the general question of treatment in typhoid fever, the cold affusion is of essential use in the ataxic form of the disease. When lecturing on scarlatina, I told you what the cold affusion is, and how it ought to be administered. The mode of application is the same in typhoid fever. I will only remark that you will not meet with that opposition to its employment on the part of the relations of the patient, which is so often encountered in cases of scarlatina and other eruptive fevers. They have no dread of an imaginary driving in of the eruption, and consequently you are left much freer in your movements. If circumstances prevent your using the cold affusion, you may have recourse to cooling lotions, such as bathing the skin with vinegar and water. Tepid baths, particularly at the beginning of the disease, are of undoubted benefit: the patient may remain in the bath as long as he can bear it.

I will now go back to the subject of *malignity*, that I may point out the differences between it and ataxia. Malignity, as I have already said, is a kind of ataxia, but it is an ataxia of those organic functions the regular and continuous exercise of which is indispen-

sable to life. Here, the morbific cause having struck directly in its essence the force presiding over vital functions, the co-relation of which is broken; and there is not only collapse as in adynamia, but annihilation, existence being threatened with an immediate and insidious termination. The older physicians perfectly understood these differences, recognising a true, primitive, protopathic malignity, declaring itself all at once at the beginning of the disease, and a secondary, deuteropathic malignity supervening at a later stage. You cannot do better, in relation to this subject, than to read the aphorisms of Stoll on febrile debility and malignity.

Malignity arises in two very distinct ways. It may be dependent on causes in themselves injurious to life, such as mental emotions, depressing passions, and vegetable or animal septic poisons, to which probably belong the morbific principles which engender epidemic, endemic, and contagious diseases—principles which vary in their activity according to the epidemic, and according to the nature of certain unknown influences. At other times, the conditions which give rise to malignity belong exclusively to the individual. Those which are known generally depend upon impaired vital energy arising from prolonged excess of any kind, or upon excessive sanguineous or other discharges consequent upon previous diseases. Any morbid cause taking the economy by surprise when under such conditions, may bring on maladies which will assume the character of malignity.

The characteristic signs of malignity are the occurrence of symptoms having no apparent relation to the nature of the disease, the constitution or temperament of the patient, or the ordinary influence of external or internal modifying causes; and great anomalies in the symptoms, for example, the exclusive predominance and confused mixture of some symptoms, such as very high temperature associated with very feeble pulse—the alteration of symptoms, such as extreme cold succeeding burning heat—the moderation and apparent regularity of the symptoms during the first period of the disease, and their fatal severity at a more advanced stage, without any apparent or adequate cause. Other signs of malignity are sudden debility, disorder of the circulation, irregularity of the pulse, great acceleration of the respiratory movements; also, great dyspnœa, of which the patient makes no complaint, and which is neither explained by auscultation during life, nor by examination of the thoracic organs after death.

This malignity is met with in every species of fever, in intermittents (then called "pernicious"), and in eruptive and non-eruptive continued fevers. Thus, we have seen malignity in scarlatina, measles and small-pox; but malignity is more commonly met with in typhoid fever, in combination with its simple, adynamic, and ataxic forms, and constituting a variety of the disease, which has been erroneously regarded as a distinct species, and designated "malignant fever."

Parotitis and Deafness as Prognostic Signs of Dothinenteria.

Gentlemen, such of you as have attended my clinical wards for some years, must have seen patients affected with *parotitis* at the termination of dothinenteric attacks. Very recently, you may have observed this occurrence in a young man of twenty, in St. Agnes's ward. This is what the old physicians would have called a crisis or metastasis; but I call it a very evil-boding complication. The significance of parotitis is very differently regarded; some look on it as always a serious complication, while others consider its appearance as an announcement of the favourable termination of the disease. For my part, gentlemen, I regard parotitis as a very formidable complication: it is an affection from which I have almost never seen dothinenteric or other fever patients recover.

It is not so with deafness, in respect of which, however, differences have to be established. When the deafness is only on one side, the prognosis ought to be guarded: there is reason to fear a lesion of the organ of hearing, and suppuration often supervenes, resulting it may be from simple catarrh of the mucous membrane of the external auditory canal, or—and then the case is more serious—in an alteration in the petrous portion of the temporal bone, which leads to affections of the brain. I saw an example of this in a woman who died from an affection of this kind, developed spontaneously and without antecedent typhoid fever; at the autopsy we found, as you will recollect, inflammation at the base of the brain. When the deafness occurs on both sides, I generally look on the prognosis as favourable; I have often called your attention to this point, stating that I have almost never seen persons die from dothinenteria who had been deaf on both sides during the course of the disease. In these cases, I look on the deafness as depending upon the propagation of the catarrh to the Eustachian tubes. I do not say that

the deafness is the cause of these patients recovering; but simply that I have rarely seen dothinenterie patients die who had been deaf on both sides. Without being able to explain this clinical fact any better than those who have stated it before me, I state it to you, and ask you to verify it in your practice.

Dothinenteria may at first Simulate Intermittent Fever; and Marsh [Intermittent] Fever may likewise at the beginning of the attack Simulate Dothinenteria.

Gentlemen, there is in bed No. 29 *bis* of our St. Bernard ward a woman twenty-eight years of age, ill of dothinenteria, whose case up to the fifteenth day presented peculiarities which I must point out to you. This woman has been resident in Paris for the last four years and a half, and up to her present illness, has always enjoyed good health. One day, without any known cause, she had a feeling of a sort of feebleness. Next day, she sat down as usual to her needlework, going to the shop where she worked, although she experienced a certain degree of discomfort, and had less appetite than usual. She tried to eat, but digestion was difficult. This condition continued for five days, and was accompanied by weariness and pains in the limbs, some pain in the loins, nausea, several fits of vomiting, and a very constipated state of the bowels. She stated that once in two days, she had had, about four o'clock in the afternoon, an attack of shivering followed by heat and then by sweating; and she informed us that these paroxysms of fever soon came on every day, assuming a double-tertian type, a fact which she indicated by mentioning that they were more violent one day than another. She was a native of Champagne; and had never had intermittent fever. When she entered the Hôtel-Dieu, on the 11th June, she stated that she had been so ill since the 4th as to be obliged to keep her bed, and discontinue her occupations.

When I saw her for the first time, she had very moderate fever, but on the previous afternoon the fever had been very high; and every evening it returned. There was enlargement of the spleen, which extended several finger breadths beyond the false ribs. There was obstinate constipation. The day after the patient's arrival, a mild purgative was prescribed. On the third day, the

fever was continuous. There was no diarrhœa, but the tongue was red, clammy, and coated with a thin dirty fur. On the fourth day—the sixteenth from the beginning of the disease—we found rosy lenticular spots on the abdomen, and one of the same spots afterwards appeared on the face. This fever which began as an intermittent, at first tertian and then double-tertian, became remittent and then continued, and was in point of fact an exceedingly well-marked case of dothinenteria.

There is no novelty, gentlemen, in this case. Those who have read the writings of physicians of past ages know that those great masters of the healing art were struck with similar cases, which you will find recorded in the works of Sydenham, Morton, Huxham, Van Swieten, Stoll and many others. While they pointed them out, however, they did not explain them as I do: they saw in them a transformation of intermittent into putrid continued fever, produced under the influence of bad diet, and bad treatment, when, for example, cinchona had been given too soon, in too great quantity, or for too long a time. Now, as I pointed out to you, when speaking of intestinal catarrh, in particular circumstances, whilst one morbid cause is acting upon an individual, and has already affected him with a disease, a new malady may supervene and place its stamp upon that which previously existed; but this is not transformation, and, correctly speaking, there is no such thing as a real transformation of one disease into another.

We can in this way understand the mistake of those illustrious practitioners of whom, in spite of their errors, we must say what Fontaine said of the poets:—"We cannot go in advance of the ancients: they have left us only the glory of following them well." In point of fact, gentlemen, the great masters of whom I speak—less informed than the moderns in the detailed information furnished by pathological anatomy, ignorant of means of investigation which we possess, such as auscultation, brought all at once to a very high degree of perfection by Lænnec its inventor—the Sydenhams, the Van Swietens, the Stolls, and a host of others, inspecting nature with scrupulous attention, knew the patient better than we know him, though we know better how to make the diagnosis of the lesion. Read the magnificent descriptions which they have given us; and when they refer to diseases of which all the manifestations were accessible to their observation, I doubt whether you will find in modern authors anything to compare to them. Even when some

features are wanting in the picture, still, with what vigour is the sketch drawn!

Guided alone, however, by the phenomena which they observed with marvellous sagacity, they could not avoid falling, and in point of fact did fall, into inevitable errors. Thus, with respect to typhoid fever, which they saw presenting itself with very different symptoms, they found themselves under the necessity of making as many species as there are forms of the disease: they were unable to gather them up into one bundle, which Bretonneau accomplished when he discovered that whatever other symptoms might be present in typhoid fever, there was one lesion which was characteristic and constantly met with. If our early predecessors had found the specific intestinal eruption, they would have had like us their testing sign to distinguish the disease in a precise and positive manner; they would have avoided confusion; they would no more have mistaken dothinenteria under its different aspects, than they would have mistaken small-pox, scarlatina, or measles.

But since their day, how many steps has it taken to arrive at the truth! Prost, in his work, published in 1804, entitled "*La Médecine Eclairée par l'Ouverture des Corps,*" was first: he described, upon the whole, very well, some of the alterations of tissue peculiar to dothinenteria, the ulcerations which he met with being in his opinion the last stage of a phlogosis, of which the first stage was redness: afterwards, finding this redness in the intestines of all persons dying from different diseases, provided they were not anæmic, he concluded that intestinal inflammation was almost always the cause of death, a false notion, which at a later period was taken up by Broussais, and gave birth to the celebrated doctrine of the Val-de-Grâce, entirely founded on a heresy in pathological anatomy. Seven years after the treatise of Prost, MM. Petit and Serres wrote their work—"*Traité de la Fièvre Entéro-mésentérique:*" —they advanced a little nearer to a conception of the truth, by establishing the specific character of the intestinal lesion, which they very justly compared to small-pox or cow-pox; but they were still far from grasping the true bearing of the facts, for, not realising what was due to the progress of the eruption, and not perceiving that the lesion varies in appearance according to the stage of the disease, they recognised three varieties of the fever, viz., the simple, the papular, and the ulcerous. Then came the remarkable labours of Bretonneau, which shed a perfectly new light upon

the history of fevers, and by using which no one in the present day can be deceived.

Dothinenteria being in the present day characterised in an exact manner, we have nothing to do with the transmutations which our predecessors were in the habit of pointing out: we no longer see intermittent fevers change into putrid fevers, though we observe that under certain circumstances the latter at their commencement assume the aspect of the former. It often happens that on interrogating and attentively examining the patient, we find a more or less conspicuous group of symptoms not met with in marsh fevers, and commonly occurring in continued putrid fevers, which put us on the way to a correct diagnosis. To such groups of symptoms belong headache, insomnia, and vertigo; also, softness of the pulse, tendency to diarrhœa, and gurgling in the right iliac fossa brought on by pressure over the part.

Besides, after the first paroxysms, the type itself of the fever assists in clearing up the nature of the case. The further we are from the onset of the disease, the shorter is the interval between the paroxysms: at first, there is a paroxysm of fever once in two days, then it occurs daily, or the type becomes double-tertian, as in the woman of bed No. 26 *bis;* then the fever in place of being intermittent is remittent, and so by degrees assumes the continued type, with which at last it is completely invested. From the beginning, the case is so absolutely dothinenteric, and so removed from the nature of an intermittent transformed into a continued fever, that if the patient were to be carried off about the seventh or eighth day by an accident, before the disease had become permanently invested with its own external characters, the specific intestinal lesion would be seen at the autopsy.

Enlargement of the spleen, which occurred in the case I have just described, may lead to an error in diagnosis. Splenic enlargement which exists in nearly all cases of marsh fever, of which indeed it is the anatomical characteristic, is likewise present in nearly all cases of dothinenteria. There is a circumstance which may perhaps serve to distinguish the one from the other: in putrid fever, there is engorgement of the spleen from the beginning of the attack, which often diminishes as the malady goes on, whereas in marsh fever it is at first slight, but increases with each repetition of the febrile paroxysm, till at last it sometimes attains an extraordinary size. It is particularly in districts where marsh fevers are endemic, and in

persons who have not been long absent from such localities, that we see dothinenteria begin by showing the intermittent type. We had an example of this in a woman who presented at the beginning of the fever symptoms similar to those experienced by the patient who occupied bed 29 *bis*: she had lived for a long time in a district where intermittent fevers were always prevailing.

Change in the type of a fever also occurs in an inverse order; and it is likewise in places poisoned by emanations from marshes that this is observed. A true marsh fever which has at first shown itself with the continued type, and has simulated dothinenteria, soon assumes the regular intermittent type, and, as the case advances, becomes tertian, double-tertian, or quartan.

The term "intermittent" cannot, therefore, be reserved, as is usually the case, to designate only one species of fever, the phenomenon of intermitting being a very variable sign, and one met with in every kind of fever, as I have just said. Consequently, I think we ought to substitute for the term "intermittent" fever, the term "marsh" or "palustral" fever. Now, marsh fever is just as incapable of being transformed into dothinenteria, as is dothinenteria of being transformed into marsh fever; but it is quite necessary to know that changes of type take place. A case of marsh fever, which at the beginning was a strongly marked intermittent, may become continued, though this is not a frequent occurrence; just as a marsh fever may at first be continued, and soon assume in a well marked manner its own intermittent type. Cases collected in the French possessions of Africa, (where our military physicians have elucidated this important question), have conclusively shown that marsh fevers undergo these changes of type. Science and art are particularly indebted to Dr. Boudin for having cleared up this point in nosology better than any one who preceded him.[1] The malady, then, does not change its nature when it undergoes change of type: under all its different forms, it remains the same marsh fever; and the proof of this is that it is always as necessary in treating it, to have recourse to cinchona (or its substitutes, such as the arsenical preparations lauded by Boudin,) when intermittents become remittent, as in those which are continued before they assume their ordinary type.

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[1] Boudin:—Traité des Fièvres Intermittentes; 1842.—Traité de Géographie Médicale; Paris, 1857, T. ii, p. 530.

If then, gentlemen, you are practising in a district where marsh fevers are not endemic, do not be too confident as to the character of the intermittents you meet with, when they are not quartans nor well-marked tertians :—be distrustful of them when they are double-tertians, but particularly when they are quotidians. Before administering cinchona or sulphate of quinine, wait, and observe whether the type is not going to change : it may not be long till you see the intervals between the paroxysms become shorter and shorter, and the paroxysms become less and less paroxysmal, so that, for example, if during the first three or four days, the rigors continued for an hour accompanied by chattering of the teeth and great discomfort, by the fifth, sixth, or seventh day, they will not last more than half an hour, and by the eighth or ninth day they will be quite transient. But whilst the paroxysm becomes less defined, its duration becomes longer every day, the continued form of fever becomes more and more decided, and very soon dothinenteria is fully characterised. On the other hand, if you are practising in a locality where marsh fevers generally prevail, do not be in a hurry to begin the treatment of a malady, which though it commenced with the symptoms of continued fever, may present the paroxysms of a remittent at the end of four or five days. You will probably soon see the fever assume a well marked paroxysmal character.

Though the manner in which the old physicians interpreted the facts was erroneous, the facts themselves were not the less real; and they were right, when, following the precept of Hippocrates, they refrained from interfering with an intermittent till after the seventh paroxysm. By acting thus, you will avoid the risk of being led to believe that you have reduced an incipient dothinenteria to the proportions of a regular intermittent fever which can be easily cut short by cinchona, when in reality you have only had to do with a marsh fever which had at first the continued type. On the other hand, if you have a case of mild synocha, such as is so common at Paris, which in the beginning of the attack assumes the intermittent type, and in general terminates spontaneously in recovery, you will not make the mistake of supposing that you have cured a real intermittent fever, whether it be with cinchona or the sulphate of quinine, or with pretended febrifuges such as the bark of the horse chesnut, table-salt, &c. recently extolled, and which owe their apparently successful results to the fact of their having been administered in cases similar to those of which I am now speaking. Finally,

when you perceive that you have to do with a case of dothinenteria, exhibiting at the outset the phenomena of intermittent fever, you will not have to take blame to yourself for having had recourse to unsuitable treatment, nor will you accuse cinchona of having changed a fever which is not generally serious into a formidable disease.

Contagion.—Conditions under which Dothinenteria occurs.

Opinions, gentlemen, are still divided on the question of the contagiousness of dothinenteria, but the number of the disbelievers in contagion is daily diminishing. We cannot attain the solution of so complex a problem in Paris, where, as in all large towns, we want the information necessary to enable us to trace cases up to their origin. The question has, however, been answered by physicians practising in small places, where it is easy to know the patient who was first seized. It is, therefore, to physicians who are so situated that the question has to be put.

On examining the reports annually received by the Academy upon epidemics prevailing in the departments, one becomes convinced that the contagious character of typhoid fever is among the ascertained facts of science. So far back as 1829, the fact was announced by Bretonneau, by Gendron of Château-du-Loir, and by Leuret: it was repeatedly confirmed by Letanelet, Lombard, Mayer, and Thirial, and more recently by Piedvache, Letenneur, Ragaine of Mortagne, and many others.

Without seeking to accumulate further proofs in support of my proposition, I will confine myself to making you acquainted with some characteristic facts, which have already been placed before the Academy in the report I was commissioned to present on the epidemics which prevailed in France in 1857. By quoting exactly the narrative of the observers themselves, we shall be better enabled to see the degree in which the term *contagion* is applicable to the transmission of dothinenteria. The importation of the disease into the locality where it is spreading, by an inhabitant who has contracted it elsewhere, can almost always be made out, if the circumstances are carefully inquired into. When the malady is once installed, its propagation goes on by a series of transmissions, which are sometimes very easy, and at other times impossible, to follow.

At Maylargues, in the department of Lot, according to the report of Dr. Mayneur, there arrived about the end of November 1856, a soldier discharged from the army of Africa: a month afterwards, he died of typhoid fever. Towards the close of his illness, a woman, a neighbour who had attended upon him with the most careful assiduity, took the same disease, and died. A brother of the soldier, aged sixteen, also died of it on the 6th of March. Two of his sisters, in the same month, contracted the disease successively, and recovered after tedious convalescence. The female neighbour whom I have mentioned, communicated the disease to a son, aged seventeen, who died on the 22nd of May. In a short time after this, the fever struck down so many people, that it became impossible to follow its progress.

Dr. Moussillac states that typhoid fever was imported to Carriol (Gironde) by a young workman, a cooper, who came home sick to his relations. The family, consisting of seven individuals, lived in a large well-ventilated house: they all took the disease in a severe form, and three of them died of it. The disease radiated from that centre, showing itself in persons in communication with those affected; and the persons so contracting it, by removing to other and sometimes distant localities, took it with them to places where it had not previously appeared.

The epidemic of the *arrondissement* of Ambert (Puy-de-Dôme), observed by Dr. Mavel, seems to have originated in a manufactory. The house-servant fell ill on the 11th July: he was taken to his home in a village, distant two kilometers, where he was attended by his wife: he recovered. His wife took the fever, and died. A sister-in-law and an uncle, both of whom had waited on him, contracted the disease, and died of it. Soon afterwards, every house in the village had cases of typhoid fever. A woman, who was cook in the factory, and her sister, who was a work-woman there, upon feeling the first symptoms of the disease, were taken home to their family, a distance of five kilometers: one died, and the other recovered. The malady soon spread in their village; and one of the villagers who took the disease, having been removed to his home at a little distance, marked by his arrival the beginning of the epidemic in that place.

On the 31st May 1857, says Dr. Fourrier, I was called to Audon-le-Romain (Moselle) to a young man of twenty, who had arrived from Paris, where he had been unwell for some days. He had all

the symptoms of typhoid fever, and the intestinal affection was very acute. Companions who came to see him were, after him, my first patients; and subsequently, his father, brother, and two sisters were successively struck down by the disease. So long as field-work kept the inhabitants of Audon away from their dwellings, the fever, though scattered about in the village, remained limited to a small number of individuals; but when harvest was finished, and the people remained constantly with the sick, a general infection of the community took place, and at one time, among the 442 inhabitants, there were 40 cases. A workman of Anderny went to work at Audon during August: he there contracted the disease, and on his return home gave it to his wife and father-in-law. Up to his return, there had been no cases of typhoid fever in Anderny. A man, aged sixty, went on business to Audon, and notwithstanding of his advanced age, took typhoid fever on returning to the village where he resided. When he had been ill for fifteen days, his son aged twenty, took the disease, and soon afterwards two daughters aged respectively seventeen and thirteen. If, adds Dr. Fourrier, people are so sceptical as to see nothing more than coincidence in all this, I ask wherein will they see the relation of cause to effect?

Dr. Reignier mentions the following circumstances. On the 29th July, 1855, a girl aged twenty-four, called Théobald (de Trombern) experienced the first symptoms of an attack stated by a physician to be typhoid fever. The Théobald family was in easy circumstances in the village: the most assiduous cares were adopted with a view to overcome the disease; and at the end of six weeks, the patient was re-established in health. This remained an isolated case for eight days: a second case then occurred in the next house: some days later, there were new cases in another house: but none of the persons affected had had any communication with the girl Théobald. The contagious character of the epidemic afterwards became well marked. It is worthy of notice that the earliest case of the disease occurred in the first house of the village on the north-eastern side, and that the subsequent cases appeared in order of succession from house to house, till the opposite or south-western extremity was reached.

A boy, twelve years of age, cow-herd to the mayor of Bièvres (Aisne), whose wife and daughters successively had had typhoid fever, contracted it, and brought it with him to his village, Orgeval, distant three kilometers, and where there had been no case of the

kind. He there communicated it, to a female relation who waited on him, and she gave it to another female relative who came from the other end of the village to assist her. From that time, typhoid fever spread in the village. Nor was that all: a young man, employed as a servant in the house at Orgeval, took the disease, was sent to his home, a distance of six kilometers, whither he carried the disease, which became epidemic in the place. This case and others of the same kind are mentioned by Dr. Piermé, a resident practitioner under whose observation they occurred.

At Chamouille, in the same department, Dr. Guipon who observed the disease with scrupulous exactitude from the beginning of its outbreak, has published an account of the epidemic accompanied by an ingeniously expressive little map of the localities. A young man, Louis Meurice, took typhoid fever, without any known cause, between the 26th June and the 13th July 1857. His aunt, living at Bertrand's mill, two kilometers from Chamouille, brought the disease into her house, where her husband and three children took it in succession between the end of July and 1st October. The woman died; and on her death one of the sick children was taken to Chamouille, to the house of a woman called Millepas, forty-five years of age, who after attending on the child, took the fever, and was under treatment from the 15th September to the 1st October. Eight days afterwards, a woman, her neighbour, took to her bed. On the 17th September, a woman of the name of Deguay, aged forty, who had attended upon the patients at the mill, contracted the fever, and suffered under it from the 17th October to the 3rd November. Two months after its first appearance in Chamouille, the fever became epidemic there. In a population of 224, there were 27 attacked.

Similar facts were observed in the epidemics of 1856. Typhoid fever was carried to a hamlet in the department of Loir-et-Cher, by a young man who went there to be attended upon by his family. His father and mother, two brothers, a sister, and the house-servant, all of whom were almost constantly with him, contracted the disease: the sister and the servant died. The young man, who was a servant at Pont-Levoy, was succeeded in his service by a person who was lodged in the room which his predecessor had left: in a short time he also took the disease. M. Yvonneau, who gives these details, traced out with praiseworthy care the history of the spread of the fever within these narrow limits of the epi-

demic, and the documents which he has furnished on the subject may be profitably consulted.

At Paris even, unexceptionable facts of the same description have been pointed out; and one was recently communicated to me by Dr. Firmin, under whose observation it came. M. de G., aged twenty-four, employed in the service of the Western Railway took fever at Batignolles. He was removed to his brother's house in the rue Suresnes, where he was waited upon by his mother, who was recalled to Paris, after an absence of two months, to attend upon him. On the twenty-second day, this lady felt the pains, lassitude, and prostration characteristic of the beginning of the fever, and she very soon had all the symptoms of thoroughly confirmed dothinenteria.

From the examples I have now given, the contagious nature of dothinenteria is incontestable. When in opposition to these positive facts, negative facts are adduced, and an exaggerated importance is assigned to them; when we are asked to explain why it is so rare to see persons contract the disease in our hospital wards from the patients who have it; when we are referred for example to the statement that of 439 cases observed at the Hôtel-Dieu by Chomel and Louis only 10 began in the hospital—we mention, among other possible explanations, that the individuals who thus escaped may at some former time, have had the disease. An explanation of a more general character consists in the admission which must perhaps be made, that the energy of the *contagium* is less when cases are only occurring sporadically, than when typhoid fever is prevailing as an epidemic.

As it is frequently impossible, notwithstanding the most painstaking researches, to discover the origin of the contagion, and as it is obvious that typhoid fever at some time or another had a beginning, we cannot refuse to admit the possibility of its arising spontaneously, although we hold that it is a contagious disease. Let us see then under what conditions it is developed. Some of the conditions must be sought in the individual himself, and others external to him. The first are the exciting causes, the chief of which is contagion, the second are the predisposing causes. Both classes of causes are difficult of recognition. Were I to discuss the influence of an atmosphere vitiated by putrid emanations, the influence of spoiled articles of food and contaminated drinks, I should be occupying your time with trivialities, because these are nothing more than

hypothetical causes. I will pass over these topics as well as the influence of mental emotions, excessive fatigue, constitution, temperament, which have great importance in the opinion of many, and briefly consider the influence of *age*, *overcrowding*, and *acclimatisation*.

Dothinenteria is a disease of adolescence and youth. However, it is not so unusual as was long supposed for it to attack children, and even those of a very early age. At Paris, and in other places where the disease is endemic, it is very frequently met with in childhood: there are cases mentioned in which it occurred in children between two and seven months: and the nearer we come to the age of puberty, the more common is dothinenteria. In my own family, my daughter's three children had it. The disease is generally milder before than after puberty: still, even in childhood the disease often terminates fatally, and I lately saw a little girl of five and a half die of it after having been ill for little more than twenty days. Between the ages of eight and fourteen, dothinenteria becomes more common; and it is between the ages of fourteen and thirty that persons usually contract typhoid fever. You have remarked that in the different epidemics of which I have been speaking, cases were mentioned in which the patients were forty and forty-five years of age: you recollect the case of a woman of sixty-four, who died of intestinal hæmorrhage, and at whose autopsy we found dothinenteric ulceration. MM. Lombard and Fauconnet of Geneva have recorded similar ages of typhoid fever patients, and they even mention a case which proved fatal in a man of seventy, at whose autopsy they found the characteristic lesions of the Peyerian patches. Dothinenteria then, does not spare old people, though it is not a common disease in advanced life.

If overcrowding does not of itself engender the disease, it is at least a powerful auxiliary in producing it, as it favours contagion, increases the severity of the attack, and is even the cause of its assuming the most deadly epidemic character.

In respect of acclimatisation, you have had an opportunity in our own patients of verifying a fact to which the attention of physicians has long been directed, viz. that persons coming to Paris from the provinces are very often attacked with typhoid fever soon after their arrival. In the cases registered during the first six months of this year, you will see it noted that a very small number of our patients belonged to Paris, and that those who did, had lived in it only for

periods of seven years, six years, four years, two years, eight months, five months and two months.

But if we bear in mind that what is observed in dothinenteria is likewise observed in small-pox, and scarlatina, we shall be less inclined to consider non-acclimatisation as a predisposing cause. We shall recollect that among the numerous young persons of both sexes who ceaselessly crowd to Paris, some to complete their education, the majority to pursue occupations of many kinds, the greatest number, having lived in country places where typhoid fever only prevails at occasional intervals, have not paid their tribute to the disease, and are consequently in a condition to become immediately subject to the influence of the contagion, which they everywhere encounter in a populous city where the disease is in permanence. I have already told you, that if adults born in Paris take the disease less frequently than new comers, it is because the former have generally had dothinenteria during childhood or early adolescence.

I will conclude what I have to say on the etiology of typhoid fever by mentioning a curious fact first pointed out by Dr. Louis le Cottier, a physician at Mazières. He says that typhoid fever, within forty years, broke out as an epidemic three times among the inhabitants of the farm of Haut-Verger in the commune of Chapelle-Baton (Deux-Sèvres), and upon each occasion, the outbreak occurred after the cutting down of a wood upon the outskirts of which the farm house is situated.[1] Though I cannot explain this fact, I do not consider it the less deserving of being here mentioned.

Treatment of Dothinenteria.—Regimen of the Patients.

Gentlemen, you observe that in a great number of cases of dothinenteria, I remain almost passive. When it follows its natural course, when the symptoms and special complications do not demand active measures, my treatment is limited to prescribing infusion of camomille as a tisane, acidulated drinks such as lemonade or orangeade, and water sweetened with gooseberry or cherry syrup.

The intervention of art is generally useless in the eruptive fevers, to which dothinenteria presents striking analogies. Their progress is but very slightly modified by the available resources of medicine. When the cases are mild, recovery takes place sponta-

[1] See the *Union Médicale*, for 5th January, 1858.

neously; and a judicious physician will avoid disturbing the curative efforts of nature by unseasonable meddling. On the other hand, when the cases are severe, the disease often shows threatening tendencies as it advances, and then our interference may be of real benefit. But such fortunate occasions are more frequently met with in scarlatina, measles, and small-pox than in dothinenteria, yet in all of them we are most commonly obliged to recognise our impotence and submit to consequences which we cannot prevent.

Indications for recourse to active treatment present themselves, however, much more frequently in dothinenteria than in the other eruptive fevers. This arises from the circumstance that dothinenteria, much less precisely characterised, much less distinct in its symptoms than is generally the case in scarlatina and measles, and still more in small-pox, is accompanied much oftener than they are by manifestations which, while they do not take away anything from its nature, impart to it that great diversity of form which I have pointed out, and against which we have to contend: it also arises from the various forms, even the mildest, being subject to local complications of greater or less severity, which play an important part in the course of the disease.

In speaking of the adynamic and ataxic forms, I stated that in the former, the efforts of the physician ought to be directed to the support of the failing powers of nature, and that as the therapeutic indication is to promote reaction, it is necessary to have recourse to stimulants and tonics: I at the same time entered into some details. With reference to the ataxic form, I said that cold affusions were decidedly useful in moderating the excitement and irregularity of action in the nervous system.

I have already explained my treatment of intestinal hæmorrhage.

When there is very severe bronchitis, or when there is pneumonia, I give antimonials, and I produce counter-irritation of the skin, by applying a lotion of the tincture of iodine. This is a powerful counter-irritant, and one the effects of which can be regulated: it has not, moreover, the inconveniences of a blister, which sometimes, as you know, gives rise to a gangrenous sore.

I have still to recapitulate the measures I pursue in ordinary cases, particularly in respect of diet, not only the diet during the course of the disease, but likewise in convalescence. I look upon dietetic management as the chief feature in the treatment, and I attribute the success which I have had in typhoid fever to the

dietetic plan which I follow. So much importance do I attach to dothinenteric patients having proper food, that it is by dietetic means, aided by medicines, that I endeavour to subdue the symptoms referable to the digestive canal, and to regulate its functions as much as possible. It is in this way that I moderate profuse diarrhœa, correct obstinate constipation, modify a suburral condition, and restore impaired appetite.

When the bilious or suburral condition is very decided, you have seen me begin by giving ipecacuan as an emetic. I generally prescribe three grammes of the powder divided into three equal parts, directing one to be taken every ten minutes till vomiting is induced. This treatment not only modifies the suburral state, but likewise exercises a beneficial influence on the diarrhœa.

When the stools are excessive both in number and in quantity, I usually begin by ordering a saline purgative:—for example, 25 or 30 grammes of the sulphate of soda, or of the tartrate of potash and soda, medicines which probably act beneficially by modifying the intestinal secretions. This treatment is particularly indicated in cases in which the diarrhœa is accompanied by a certain degree of meteorism: in such cases, the saline purgative may with great advantage be repeated several times. When I do not succeed in thus obtaining the expected modification of the intestinal secretions, I prescribe what are called absorbent powders. One of these powders, containing 50 centigrammes of subnitrate of bismuth and an equal quantity of prepared chalk, may be given with benefit from three to eight times in the twenty-four hours, the frequency of the repetition being regulated by the severity and obstinacy of the symptoms. I also often give the English mixture, which I thus formulate:—

Prepared chalk,	30 grammes,
Syrup of orange peel,	30 „
Water,	90 „

I also frequently order the powder of Columbo root in doses of 50 centigrammes up to a gramme. Finally, when these prescriptions prove ineffectual, I have recourse to more energetic alteratives. I then prescribe 5 centigrammes of nitrate of silver,[1] to be taken in five doses, at intervals of an hour. The following is my formula:—

Crystallized nitrate of silver, 5 centigrammes,
Water, a quantity sufficient to dissolve the nitrate.

[1] Five centigrammes—that is, five hundredths of a gramme—are about five sevenths of a British grain.—TRANSLATOR.

Add to this solution, enough of crumb of bread to make a mass, and then divide the mass into five pills of equal size.

If, as sometimes happens, there is constipation in place of diarrhœa, I open the bowels by giving ten or fifteen grammes of castor oil, a purgative which in the circumstances is very much to be preferred to the neutral salts, the operation of which is soon over, and is succeeded by a tendency to confinement, an inconvenience which does not attend the employment of castor oil. When the constipation does not yield to castor oil, I prescribe 5 centigrammes of calomel in the form of pastel, and a gramme of the powder of jalap, the latter to be taken a quarter of an hour after the former. If, notwithstanding this treatment, the constipation still continue, I repeat the calomel, and in place of giving jalap after it, I give ten grammes of senna in the form of a very concentrated infusion, mixed with infusion of roasted coffee.

Generally, however, the regular evacuation of the bowels, and also the removal of meteorism when present, may be accomplished by the patient taking daily, night and morning, a lavement of infusion of camomile.

In the mucous form of dothinenteria, which is sometimes very tedious, you have seen me stimulate the appetite by administering bitters, such as the decoction of quassia, cinchona, &c. and preparations of strychnia, such as 5 centigrammes of the powder of nux vomica, or some of the bitter tincture of Baumé, which derives its stimulating properties from St. Ignatius' bean. According to the nature of the case, the patient may take one, two, or three drops of this tincture immediately before his soup.

I now come to the subject of diet. Perhaps, gentlemen, it has seemed strange to you that I should insist so positively upon the necessity of giving nutriment to dothinenteric patients, not merely as most of my colleagues now do, at a somewhat advanced period of the attack, when the fever is moderate and the tongue less coated, that is to say towards the end of the first or beginning of the second week, but from the very commencement, and during the whole course of the malady. In point of fact, I require my dothinenteric patients, from the very first, to take daily two small portions of a soup made without meat, and also some tablespoonfuls of meat broth, disregarding the repugnance to food which some patients show, and without being deterred even when there is vomiting, which is apparently a contra-indication of feeding. In cases where there is vomiting,

I advise that broths made with and without meat should be given daily in such quantities as can be borne.

This practice is now recommended by a great number of the hospital physicians of Paris, as was shown by an interesting discussion on the subject in the *Société de Médecine des Hôpitaux*, in October 1857, in which I was asked to take part, with men whose opinion is of undoubted weight. Some of these gentlemen, my honourable professional brethren Drs. Legroux and Barth for instance, do not allow their patients to have nourishing diet till about the eighth day, while Drs. Aran, Béhier, and others entertain views similar to my own, and force their dothinenteric patients to take food from the beginning of the attack. In this discussion, Dr. Cahen, judiciously appealing to the experiments of Chossat on inanition, pointed out that medical observation and physiological experiment entirely agree in showing that very low diet is injurious in diseases of long duration. Chossat had indeed seen that entire abstinence caused the body to lose forty-two thousandth parts of its weight, and that death was the inevitable result when the loss amounted to four tenths of the original weight. Mr. Cahen says that in typhoid fever we see great loss of flesh rapidly supervene, and that it even proceeds to emaciation. He asks whether it is not probable that death in these cases is less the result of the progress of the disease, than of wasting of the body having reached a point incompatible with the continuance of life. In these cases, the individual feeds upon his own body, and it is with a view to prevent this autophagy, which brings either death or very dangerous symptoms in its train; it is to support the system in its struggle with an exhausting disease of long duration, that there is a paramount necessity of vigorously prescribing suitable food.

I say *suitable food;* for while the low diet to which patients were condemned when medical practice was ruled by the deplorable doctrines in vogue at the beginning of the century, while a ridiculous abstinence from food is productive of the evils which I have pointed out, care must be taken not to fall into the opposite extreme of those who are not afraid to give solid food at the beginning and during the course of continued fevers. There is a great distance in the dietetic scale between the broths and light soups which I declare to be indispensable—between the *tenuis victus* as Hippocrates called that famous diet-drink, barley-water—and the minced

butcher-meat which some physicians compel their unfortunate patients to swallow.

"*Opportunum medicamentum est opportune cibus datus,*" wrote Celsus; and "*in alimentis medicamenta sunt*" repeated Aretæus. The doctrine which I maintain is as old as medicine itself. From the time of Hippocrates—who devoted a book to the subject—to our own day, the great practitioners of the past have always attached much importance to dietetics, which they have looked on as embracing the most powerful therapeutic resources of our art. Morton says that with the assistance of food well regulated from the beginning of the attack, he has seen fevers cured by the efforts of nature, without any recourse having been necessary to the pompous arsenal of pharmacy; while cases which at first were mild have become malignant under a repetition of copious bleedings, and the abuse of emetics and cathartics.

Permit me, gentlemen, to fortify my opinions on this subject by the authority of Graves, a man whom I regard as the most eminent clinical teacher of our age, whom I delight to quote, whom I constantly consult, and whose work ought to be your vade-mecum. Allow me also to appeal to the authority of a man who, in our own France, has equalled the illustrious physician of Dublin, and who has left behind him the light of a brilliant career: need I say, that I refer to Bretonneau! These two illustrious physicians may, to a certain extent, be said to have passed their youth in contending against the abuse of abstinence from food in fevers; and to them is chiefly due emancipation from the yoke of prejudice imposed on practitioners, by the school of Broussais, to the great detriment of patients.

Allow me then, gentlemen, to translate some paragraphs of Graves upon the subject now before us:—

"In a disease like fever, which lasts frequently for fourteen, twenty-one, or more days, the consideration of diet and nutriment is a matter of importance; and I am persuaded that this is a point on which much error has prevailed. I am convinced that the starving system has in many instances been carried to a dangerous excess, and that many persons have fallen victims to prolonged abstinence in fever. * * * Let us examine the results of protracted abstinence in the healthy state of the system. Take a healthy person, and deprive him of food! What is the consequence?

First, hunger, which after some time goes away, and then returns again. After two or three days, the sensation assumes a morbid character, and instead of being a simple feeling of want and a desire for food, it becomes a disordered craving attended with dragging pain in the stomach, burning thirst, and some time afterwards, epigastric tenderness, fever, and delirium. Here we have the supervention of gastric disease, and inflammation of the brain as the results of protracted starvation."

"Read the accounts of those who perished from starvation after the wreck of the Medusa and Alceste, and you will be struck with the horrible consequences of protracted hunger. You will find that most of the unhappy sufferers were raging maniacs, and exhibited symptoms of violent cerebral irritation. Now, in a person labouring under the effects of fever and protracted abstinence—whose sensibilities are blunted and whose functions are deranged—it is not at all improbable that such a person, perhaps also suffering from delirium and stupor, will not call for food, though requiring it; and that if you do not press it on him, and give it as medicine, symptoms like those which arise from starvation in the healthy subject may supervene, and you may have gastro-enteric inflammation, or cerebral disease, as the consequence of protracted abstinence. You may, perhaps, think that it is unnecessary to give food, as the patient appears to have no appetite, and does not care for it. You might as well allow the urine to accumulate in the bladder, because the patient feels no desire to pass it. You are called on to interfere where the sensibility is impaired, and the natural appetite is dormant; and you are not to permit your patient to encounter the horrible consequences of inanition, because he does not ask for nutriment. I never do so. After the third or fourth day of fever, I always prescribe mild nourishment, and this is steadily and perseveringly continued through the whole course of the disease."

"Again, let us see how close a resemblance the symptoms generated by long continued denial or want of food bear to those which are observed in the worst forms of typhus. Pains of the stomach, epigastric tenderness, thirst, vomiting, determination of blood to the brain, suffusion of the eyes, headache, sleeplessness, and, finally furious delirium, are the symptoms of protracted abstinence, and to these we may add tendency to putrefaction of the animal tissues, chiefly shown by the spontaneous occurrence of gangrene of the lungs. It has been shown by M. Guislain, physician to the hospital

for the insane at Ghent, that in many instances gangrene of the lung has occurred in insane patients who have obstinately refused to take food. Out of thirteen patients who died of inanition, nine had gangrene of the lungs. * * * * It is not, therefore, wrong to suppose that when a system of rigorous abstinence has been observed in fever, and when food has been too long withheld, because, forsooth, the patient does not call for it, and because his natural sensibilities are blunted and impaired—it is not, I say, unreasonable to infer that gastric, cerebral, and even pulmonary symptoms may supervene, analogous to those which result from actual starvation."[1]

Gentlemen, I require to add nothing to these true and eloquent paragraphs of Graves, who said to his pupils:—"If you are at a loss for an epitaph to inscribe on my tomb, you may use these words—He Fed Fevers."[2] We are not, however, prevented from inquiring into the causes of the terrible symptoms produced by inanition.

The normal constitution of the blood is the condition under which all the processes of interstitial nutrition take place, and good nutrition is the condition essential to the performance of the functions assigned to the different organs. It is by alimentation that the blood is renewed; and whenever there is a deficiency from that source in the elements required for the reconstitution of the blood, the nutritive processes are carried on at the expense of the materials of the living organism. The animal will then live upon itself; and as it will be unable to derive from its own substance all the elements requisite for sanguineous renewal, the quality of the blood will forthwith become anomalous, and the organs which the blood is designed to restore, will themselves become fundamentally altered in structure. The organs being thus altered, will supply the already altered blood with elements still inferior; and thus there will be established a vicious circle—the *circle of autophagy* as Bretonneau called it—a circle in which the disorganisation of the blood and the tissues goes on constantly increasing, till it ultimately attains a point

[1] Graves:—Clinical Lectures on the Practice of Medicine. Second edition, edited by J. M. Neligan, M.D. Two volumes. Dublin: 1848. Vol. i, p. 117—119.

The quotation in the text is an exact reprint from the work of Dr. Graves—not a translation of Dr. Trousseau's French version.—Translator.

[2] Quoted at p. 253 of Dr. Murchison's work.

at which the functions, which, at first were merely disturbed, become completely deranged and disassociated, death constituting the climax of this gradual destruction of the economy.

The most essential part of the treatment, then, is to give nutriment. We must observe the state of the patient with respect to strength, so that we may be able to put him into a condition to resist the fever by which he is being devoured: according to the degree of weakness, and according to the supposed duration of the disease, it is necessary to give food more or less frequently, but always in small quantity, and in the liquid form. The age, temperament, and habits of the patient, ought also to be taken into consideration, as is remarked by Jodocus Lommius in his little tract "*De curandis febribus continuis*," a work several chapters of which are devoted to the consideration of the diet suitable to the different periods of the disease.

Although I lay particular stress upon regular feeding in dothinenteria, although, as you have seen every day, I oblige the patient to take light soups, I also wait longer than others before I allow him to return to a more substantial diet. At the decline of the fever, some of my professional brethren, discontinuing the low diet which they had imposed up to that period, allow solid food to be taken; but I insist at that period upon the necessity of restricting the patients to light farinaceous food, and during convalescence (even when it is fairly established), I am among those who keep them on the shortest commons.

Having been careful to maintain the strength during the whole course of the malady, however long its duration may have been, I have nothing to fear in my patients from the disastrous consequences of abstinence and inanition; and can more easily protect them from the unfavourable occurrences to which they continue liable at the very time that they suppose their recovery to be complete. I thus avoid bringing on attacks of indigestion, which, though they may not cause serious gastro-intestinal mischief, nor (as sometimes happens) fatal peritonitis, may nevertheless lead to relapses, or may retard restoration to health. During the convalescence of dothinenteric patients, it is, therefore absolutely necessary to resist their demands for food, when, as is usually the case, they have a craving appetite.

There are cases, however, in which it is requisite during convalescence, to return quickly to a very substantial and very tonic kind

of feeding, proceeding always with extreme caution. That is the period during which occur the symptoms of which I am now going to speak, and which are most frequently met with in persons exhausted by a rigorously low diet, or by hæmorrhages.

Affections which occur during Convalescence.—Gastric Disturbance. —Vomiting.—Diarrhœa.—Nervous Symptoms.—Vertigo.—Delirium. — Impaired Mental Power. — Paralysis. — Dropsical Effusions.

The convalescence from typhoid fever is sometimes interrupted by gastric disorders, which, unless very carefully attended to, may deceive the physician from their seeming to demand treatment the very opposite of that which they really require. I refer to vomiting and diarrhœa, both particularly apt to occur in those who have been reduced by starvation. It seems as if the stomach and intestines, having forgotten how to perform their allotted functions, can digest nothing. The smallest quantity of liquid food, or even of tisane, is at once rejected by the mouth; and there is a notable increase in the number of the alvine evacuations. The patients are exceedingly weak, their circulation is languid, and their temperature is perceptibly lowered. Not only are the liquid ingesta vomited, but there is regurgitation of mucous and bilious matter of a colour successively varying from yellow to apple-green, bottle-green, leek-green, greenish-blue, or even pure blue. Under the belief that the powers of the stomach are inadequate, and that the symptoms are the result of gastritis, the use of every kind of food is suspended: the patient is given skimmed milk, chicken-broth, and mucilaginous drinks, which, far from calming the disorder of the functions, increase it. When I come to speak of dyspepsia, and its different forms, I will tell you that gastritis, regarding which so much that is erroneous has been stated, is a rare disease; and that, on the contrary, the food apparently most calculated to excite inflammation of the stomach is that which is most easily borne. I now refer to symptoms connected with the nervous system, to disorder of the function of secretion, the best means of subduing which is to give solid food. In these cases, it is not broths and soups that one must prescribe, but grilled or roasted meat in small quantities, fermented liquors, and good old wine in moderation. In some cases, eating what are called heavy kinds of meat, such as pork, is the only means of subduing obstinate vomit-

ing. Under the influence of this regimen, the digestive canal by degrees recovers its tone, and soon digests as before: the vomiting stops, and the diarrhœa gradually ceases.

But, gentlemen, beware of mistaking the symptoms of which I have been speaking for the relapses which occur from errors in diet. In the latter, there is real indigestion. The fever also is rekindled, the stupor recommences, the exanthematous spots reappear on the skin, and (as in cases which I have described to you) the dothinenteria seems to take a new start. In such circumstances, it would be exceedingly dangerous to insist upon feeding the patients with nutritious aliment. On the contrary, it is necessary for some days to subject them to a rigorous low diet—to restrict them to emollient drinks and farinaceous food; to give chalk and bismuth; and to wait till the storm is past, before returning to a more generous diet.

Vertigo dependent on autophagy is more common than the other pathological phenomenon of which I have just been speaking. I will not, however, at present stop to consider it, but will reserve what I have to say regarding it till a future occasion, when I shall have to discuss the general subject of vertigo arising from disordered digestion.

But *delirium* is, of all the nervous symptoms which demand the attention of the physician during convalescence from putrid fever, that which is most commonly met with: if its possible occurrence is not foreseen, and its cause is not attentively sought out, it may lead to the belief that there is a serious cerebral affection.

We had a singular illustration of this remark in the case of a patient who occupied bed No. 16 of St. Agnes's ward. This young man, at the twenty-ninth or thirtieth day of a putrid fever, in which he had had copious intestinal hæmorrhage about the end of the second week, was convalescent, when he was seized with delirium, more continuous and more violent than he had had even when the disease was at its height. All the other symptoms, however, were for a long time in abeyance: regular stools had succeeded to the diarrhœa, and there was no longer any pulmonary catarrh: there was no fever, the pulse was only 64, and the temperature of the skin was natural.

The cerebral symptoms might have led one to believe that there was a lesion of the brain similar to that observed by Piédnagel in a certain number of cases, a lesion consequent upon irritation or sub-

acute inflammation of the pia mater and grey substance, and bearing some resemblance to what is sometimes met with in persons sinking under the general paralysis of the insane. My colleague of the Hôtel-Dieu supposes that the delirium of the convalescence from typhoid fever is caused by the persistence of this inflammation, which in other respects he regards as an unimportant affection, and as not at all serious, inasmuch as it is very curable. The proposition stated in this way is far too absolute. I at once grant that the disturbance of the intellectual faculties is dependent upon an altered state of the encephalon: I admit that this alteration may be the result of congestion and inflammation of which we can find traces on examining the dead body; but it is also a fact, that often no such traces are discoverable. Without giving an opinion as to the nature of this affection, it may be stated, that, be it what it may, it is an alteration produced under the influence of a septic malady which produces radical changes in the fluids, and acts specially upon the nervous system: and it may likewise be stated, that in proportion to the length of time during which this influence operates upon the economy, is the duration of the period required for a return to a normal condition. But disturbance of the intellectual faculties may also arise from the individual having been exhausted by great loss of blood, or by starving; the brain under such circumstances being deprived of its natural excitant, the blood. Now, the organ of the intellectual faculties will be longer in resuming its original activity, in proportion to the longer or shorter duration of the state of feebleness, exactly as is the case with the muscles, which, when they have been inactive for a long time, do not all at once regain their power. And possibly, this state of feebleness, or cerebral atony, is the most common cause of the symptoms of which I have been speaking.

To sum up:—If the delirium and vertigo which supervene during convalescence from typhoid fever, and that hebetude which the patients retain for even from five to ten months after recovery, and which some never lose, are referable to a subacute inflammation of the membranes and cortical substance of the brain, there is generally no appreciable organic lesion, and the pathological phenomena seem to be dependent upon cerebral anæmia resulting from debility, and requiring to be treated by tonics and stimulants, exactly like muscular debility, to which I have compared it. The correctness of these views is shown by the delirium ceasing and the intellectual

faculties returning to their normal state under the influence of generous diet. You saw a patient who occupied bed No. 8 of our St. Bernard's ward, who after remaining in a state of imbecility for six weeks after recovery from severe putrid fever, regained simultaneously her intellectual faculties and her muscular power.

In such cases, it would be a serious blunder, leading to aggravation of the symptoms, to resort to antiphlogistic treatment, from an idea that there existed inflammation or congestion. In a case similar to that of the woman in St. Bernard's ward—the case of the man who occupied bed No. 16 of St. Bernard's ward—you saw me prescribe stimulants and tonics, wine and coffee, as well as solid sustaining food.

Typhoid fever is not the only disease which is succeeded by disorder of the intellectual faculties : it occurs after all septic diseases—after small-pox, scarlatina and diphtheria—and it is always by the same kind of treatment that the cure has to be brought about.

Still, it is a cardinal point, a matter of absolute necessity, to proceed with very great caution, so as not to exceed reasonable bounds. While the diet is essentially tonic and reparative, it must be kept strictly within the limits of the digestive power: you must not go on at too great a speed from a desire to proceed without loss of time. If the quantity of food taken is in excess of the digestive capability of the individual, the gastro-intestinal symptoms will be aggravated, in place of being subdued, the vomiting will continue, and increase in severity—the diarrhœa will assume a much greater intensity, and the patient will succumb under the inveterate consequences of indigestion.

The different forms of *paralysis* which supervene during convalescence from dothinenteria also belong to the same class of symptoms as those which we have just been considering; like vertigo, delirium, and mental debility, the different paralytic affections originate in shock of the nervous system, in organic and functional modification throughout its entire extent, caused by the morbid poison, which, having in the first instance acted directly on the nervous system, continues so to act during the whole course of the disease. We can understand that the longer the duration of the malady, the more numerous will be the symptoms indicative of disturbance of the nervous centres, such as stupor, prostration, impaired muscular contractility, delirium, and convulsive movements: we can understand, I say, that the more decided the adynamic or

ataxie symptoms are, the more time will be required for things to return to their normal state. Putrid fevers, when the attacks are severe and protraeted, often leave patients in a state of very great weakness, from which they emerge with diffieulty, and whieh sometimes eontinues for several months. It is likewise after these dangerous forms of dothinenteria that we meet with the paralytic affections now under consideration.

The paralysis is sometimes general, affecting not only motion and sensibility, but also the senses, the patients being deaf and blind, as well as unable to move: sometimes also, it is localised, in which case it is generally seated in the lower extremities; at the same time implicating the bladder, so as to cause retention or incontinence of urine, micturition being either an overflow of the bladder, or the result of the inability of the paralysed sphincter to retain the urine: there is also sometimes paralysis of the rectum, the patients involuntarily passing their stools. You must beware of being misled as to the nature of these cases: you will often meet with patients who seem to have this description of paralysis of the sphincters, when it really does not exist. You remember in bed No. 4 of St. Agnes's ward, a young man who for several days soiled his personal linen and the sheets. In him, as in others, this proceeded from mental debility, or, more correctly speaking, from the laziness resulting from that debility. It is sufficient in such cases to make the patients ashamed of their dirty habits, and to threaten them with low diet in the event of their not discontinuing them: you will particularly observe cases of this kind in children. Finally, paralysis may locate itself exclusively in the organs of the senses, producing a longer or shorter continuance of blindness or deafness. A restorative regimen and tonics are the only means by which we can get rid of these untoward symptoms.

The diagnosis of these paralytic affections seems so simple, as to preclude the necessity of saying a word on the subject; but nevertheless, cases occur in which you might find yourselves at fault. The case of our patient in bed No. 4 is a proof that one has to distinguish between a true and apparent paralysis. The following history, communicated to me by a physician in town, will show you how much complexity there may be in this diagnosis.

A girl, twelve years of age, had a serious attack of putrid fever: during convalescence, she was absolutely unable to walk. Her physician having recommended exercise in the open air, she was taken out in a little carriage, but as no improvement occurred under this

treatment, she was sent into the country. No amendment had taken place in her condition, when by mistake, she was one day left alone locked up in her room. Great was the surprise of her attendants, when, on their return, they found the door open, and the patient on her feet: to liberate herself from confinement, she had walked. The relations exclaimed that a miracle had been wrought; but unfortunately, the miracle was not a complete cure, for on the following day, the paralysis returned, and at present, according to the information which I received from the attending physician, the patient is still unable to walk.

In this case, gentlemen, the paralysis was certainly not a consequence of the fever: paralytic affections consequent on fevers do not terminate so suddenly, and when they have ceased, do not so quickly return. Though I did not see the patient, I think I may say that her affection was hysterical paralysis, for paralysis is often simulated by one of those strange whims which get into the heads of that singular class of patients called hysterical. If, as an objection to this opinion, it be said that the youth of the girl hardly allows us to suppose that her case was of this class, that at her age there is unfeigned lightheartedness, while the affection condemned her to long-continued rest and prevented all participation in the games which constitute so large a part of the occupation of childhood, I reply, that hysteria is not a rare disease, even in children of twelve years of age. In cases of this kind, we must have recourse to moral more than to what are considered strictly medical means of cure.

I have recently been studying, in a convalescent dothinenteric patient, a form of paralysis which may occur as a sequel to any severe disease, but which is most frequently observed after fevers. It is the consequence of the disease itself—of its duration and severity. There is in small-pox, as you know, a form of paralysis, which, on the contrary, is a concomitant of the rachialgia, of the invasion-period of the disease. This form of paralysis, occurring at the beginning of a fever, is a very important element in the diagnosis: and I am not aware that it has hitherto been observed at the commencement of any pyrexia except small-pox. I have, however, just seen an occurrence of this kind in a young woman, occupying bed No. 11 of St. Bernard's ward, who, some days after her admission, presented all the symptoms of typhoid fever. Here, in a few words, is this case.

Some years previously, the patient, on the rapid disappearance of eczema of the lower extremities, became affected with paraplegia, which continued for a whole year. She became pregnant, and from that time the paralysis gradually diminished. Her pregnancy was not attended by any serious symptoms; but her confinement took place at the seventh month. For the six following years, she had very satisfactory health, till eight days before she came into hospital, when she complained of fever, lassitude, pains in the limbs, loss of appetite, and nausea, but no diarrhœa: she made special complaint of inability to stand. On examining the patient, I found that she moved the lower extremities very feebly, and said that they were the seat of lancinating pains: she also complained of pain in the dorsal region of the vertebral column, upon percussing or making pressure over it. I thought that there was myelitis, and that it was the cause of the rheumatism. There was nothing to lead me to suppose that it was a case of variolous paraplegia, as the patient had none of the symptoms of the invasion-period of small-pox, and had had the paraplegia for eight days when I saw her. There was neither stupor nor diarrhœa, and the pulse was not bounding. It was, therefore, to my great surprise that three days after the patient came into our wards, that is to say, eleven days from the commencement of the paraplegia, I observed an eruption of rosy lenticular spots on the abdomen. The paralysis soon disappeared, and did not return in the course of the disease, nor during convalescence. The typhoid fever, which was mild, pursued its normal course, and its duration was not more than three weeks.

Here, then, is an example of paraplegia occurring at the commencement of typhoid fever. It is true, certainly, that the paraplegia occurred in a subject who had previously suffered from it for a whole year: still, the case deserves to be mentioned as one of clinical importance: it is an example of the "spinal" form of the disease, more particularly described by G. Fritz, and of which I have already spoken.

It is important to distinguish these forms of paralysis from that muscular debility which is always observed in convalescents from dothinenteria, and which is partly dependent on nervous exhaustion, and partly on that alteration of the muscular tissue which I have already described. I told you[1] that the contractile tissue of very

[1] See p. 334 et seq.

many, if not of all, muscles underwent, to a greater or less extent, granular or waxy degeneration: and that some weeks are required for the absorption of the degenerated tissue, and the formation of new contractile tissue in its stead. During this period, there is necessarily great embarrassment in the muscular movements.

The forms of *dropsy* which sometimes supervene during, and in convalescence from, typhoid fever, as well as in connection with all serious fevers, are symptoms of the same class as those we have just been passing under review. Like the nervous symptoms, they are all dependent upon a bad general state of the economy, upon the adynamia into which organic life has fallen, but more particularly upon the special alteration of the blood, which singularly favours serous effusion into the cellular tissue and serous cavities. When we recollect the frequency with which *albuminuria* is met with in the course of typhoid fever, one might be induced to believe that the dropsies of which I am now speaking were associated with an albuminuria symptomatic of disease of the kidney. But the albuminuria met with is either quite transient and purely functional, in no way connected with any real or permanent change of structure in the kidney, or it is coincident with the renal lesion characteristic of Bright's disease, as in cases observed by Rayer, Barthez and Rilliet, Christison, Gregory, and others. But in the consecutive dropsies of typhoid fever, no trace of albumen is found in the urine.

A fact, not less remarkable, to which the attention of physicians has been called by that laborious observer Dr. Leudet of Rouen[1] is, that the dropsies consecutive to dothinenteria occur much more frequently in some localities than in others, and that the influence of the prevailing medical constitution has something to do with their production. At Paris, for example, we rarely see them, while foreign physicians meet with them frequently, and describe them with great minuteness. During ten years which Dr. Leudet studied in the hospitals of Paris, and was constantly in the habit of taking down the particulars of numerous cases of typhoid fever, he never once saw dropsy following that disease, but after having been for a much shorter period a physician to the Hôtel-Dieu of Rouen he there collected eight examples.

These dropsical effusions, occupying almost exclusively the sub-

[1] Leudet:—Archives Générales de Médecine. Oct. 1858.

cutaneous cellular tissue, are generally limited to the lower extremities, where the œdema is greatest on the most depending parts, around the malleoli, and on the posterior aspect of the feet, and posterior aspect of the thighs. But sometimes there are partial effusions into the subcutaneous cellular tissue of the upper extremities: and sometimes also, there is œdema of the face, limited occasionally to one side, as in a case recorded by Virchow, in which it was associated with obliteration of the internal jugular vein. Ascites sometimes occurs. Finally, the anasarca may be general: either appearing simultaneously in the different parts of the body, or being at first localised, and then spreading.

The œdema is generally moderate in degree: in exceptional cases it is considerable, and may be compared to that which supervenes when there is organic disease of the heart. It bears no relation to the severity of the dothinenteria; and causes of debility, such as profuse evacuations and intestinal hæmorrhages, do not seem to have any effect in producing it. Transitions from heat to cold, which are such marked causes of scarlatinous anasarca, do not here seem to possess a similar influence.

Though the appearance of the dropsical affections which come on passively towards the second or third week of the fever, without any initiatory symptoms, is sometimes coincident with a febrile exacerbation, a copious eruption of sudamina, or an acute bronchitis, they generally disappear in fifteen or twenty days. When they continue long, they retard convalescence, but in other respects are not serious. They yield to dietetic management, and a purely tonic treatment demanded by the state of general debility under which they have arisen.

Gentlemen, the œdema of which I have been speaking is seen unassociated with albuminuria in some other pyrexiæ. I have often observed it in measles, and on examination the urine has generally been found to contain no albumen. But another kind of œdema which I have observed in dothinenteria, is that which is connected with obliteration of a vein: it is a real *phlegmasia alba dolens*. I very recently met with a case of this kind in one of my nieces aged twenty-four. She was seized with painful œdema about the fortieth day from the beginning of the fever. Virchow's case, which I have just mentioned, is of the same description.

Local Complications which Supervene During, and at the Decline of Dothinenteria.

1. *Softening of the Cornea.*

A woman suffering from a very severe form of putrid fever was admitted to bed No. 8 of St. Bernard's ward. During the third week, when the nervous symptoms were very severe, the eyelids were incompletely closed during sleep, leaving the inferior segment of both corneæ exposed. After some days, the conjunctiva was injected, and the eyes became bleared: twenty-four hours later, there was real catarrhal ophthalmia. On carefully examining the globes of the eyes, it was easy to see that the corneæ were swollen, and had a whitish, macerated appearance: there was also intense photophobia, and the patient, though in a state of stupor, complained of her eyes, even when not obliged to raise the eyelids. Her sight was very much affected. It seemed evident to me, and to all who went round with me at the visit, that the corneæ were completely softened, and vision hopelessly lost.

This softening of the corneæ, which, gentlemen, you have frequently observed, not only in the course of dothinenteria, but also in all diseases accompanied by cerebral disturbance, is one of the most serious complications; and one of which I was for a long time unable to understand the mechanism. I have at last, I believe, found it out: and, what is more important, I think I have discovered a very simple means of curing the affection. It is quite possible that others may claim along with me the honour of this little discovery. Should what I am about to bring under your notice in a few words have been previously observed by others, I shall in that circumstance find a cause of congratulating myself on having given my sanction to a little-known practical fact. We see, every day, our professional brethren claiming the honour of priority with a zeal which excites in me very little desire to follow their example. Let it be understood, then, that I will surrender, whenever it is necessary, all my rights over the treatment of softening of the cornea in bad fevers.

But before telling you what my treatment is, before following out the history of the woman to whose case I have recalled your atten-

tion, I am anxious to explain to you the mechanism by which, in my opinion, softening of the cornea takes place.

You have often observed in putrid fevers, that patients sleep with their eyes half open: under such circumstances, it almost always happens that the globe of the eye is turned upwards, and the cornea entirely concealed. No other inconvenience results from this condition of the eyelids, except an inflammatory affection of the conjunctiva, and if this conjunctival inflammation be, which I willingly admit it is, dependent upon the general state of the patient, as is the inflammation of the bronchial tubes and back part of the mouth, I cannot but also admit that it is aggravated by the inability to wink, as is seen in persons suffering from paralysis of the facial nerve. You all know that patients with paralysis of the seventh pair of nerves, being unable to shut the eye or to wink, have always more or less irritation of the mucous membrane of the eye: and in some cases, this irritation proceeds to inflammation, and even to softening of the cornea. The patients themselves know how to ward off these consequences, by moving their eyelids with the assistance of the finger sufficiently often to supply the place of winking; but during sleep, unless they take special precautions, the globe of the eye is left exposed to the air, and in the morning they awake with irritative congestion, pain, and blearedness of the eye.

In all severe fevers, the eyes remain partially open, and if the stupor continue sufficiently long, or be excessive, they are night and day in the condition similar to that of persons affected with paralysis of the seventh pair. Recollect also the fact, that in putrid fevers the sensibility is blunted, and that the irritation caused by the contact of the air with the conjunctiva is not felt, so that the necessity for winking is not experienced. The same thing takes place with the eye which occurs in respect of the nostrils, which become filled with dust and other foreign bodies floating in the air, because, from the parts not being sensitive to the presence of foreign bodies, the patient does nothing to get rid of them.

Reflect for a moment on the theory of winking, and you will perceive the reason of the frequency of the symptoms of which I have been speaking. There are three pairs of nerves concerned in winking. In the first place, there is the fifth pair—the sensitive pair—which transmits to the brain the impression of pain caused by continuous contact of the air, and drying of the cornea—the impression which imparts the necessity of winking. In the second place, there

is the seventh pair—a motor pair—which conveys to the sphincter of the eyelids the command to wink. Finally, there is the third pair of nerves—also a motor pair—which sends a branch to the *levator palpebræ*, and which consequently presides over the elevation of the upper eyelid. But there is still another nerve which I have to mention, and that is the lachrymal, which comes from the ophthalmic branch of the fifth pair, and presides over the secretion of the tears, which serve more than the ocular mucus to accomplish the ultimate object of winking—lubrication of the conjunctiva.

You can now understand that the performance of an act so complicated as that of winking, an act which requires the agency of so many nerves, should be disturbed, or even suspended, during such a disease as dothinenteria, which in so high a degree impairs the action of the whole nervous system.

You must also bear in mind that in severe fevers, there are other special conditions quite independent of the causes (to a certain extent physical) of which I have been speaking. In virtue of causes, very imperfectly understood, but essentially connected with the nature of septic diseases, the mucous membranes become the seat of congestions, which may be somewhat active or somewhat passive, and which easily proceed to inflammation and even to sphacelus. In the ordinary train of symptoms in septic fevers, we also meet with ophthalmia, coryza, sore throat and laryngitis, and inflammatory affections of the genitals of young girls, upon which latter class of affections I shall afterwards have to make some special remarks. You will then better understand how inflammation of the cornea, caused by absence of winking, easily passes into a state of softening, which is really a kind of gangrene.

Let us now revert to the clinical facts.

Along with Dr. Grenat, I attended a young man suffering from a nervous disease, which was deficient in distinctive characters, but presented symptoms indicating that it was a connecting link between brain fever, and putrid or common typhoid fever. There was slight congestion of the conjunctiva, arising as much from the fever itself as from the want of winking. One of the corneæ became softened, and the patient lost the eye.

This unfortunate occurrence having made me reflect, it occurred to me that if the greatest part of the evil originated in the fever, the constant exposure of the eye to the air from want of power to

wink was an important, and perhaps the principal, cause of the ultimate mischief. I forthwith took steps to be able to accomplish that which in point of fact I afterwards put in practice with great success in our patient of No. 8 St. Bernard's ward.

It seemed to me, as well as to those who were present at my clinical visits when I examined this case, that the woman must inevitably lose her sight. To me the case appeared as hopeless as it appeared to others; but I nevertheless resolved to try the plan which I had settled in my own mind was the proper treatment. Having completely closed the eyelids of the patient, I placed on them two pledgets of soft cotton, which I kept in their places by means of a moderately tight bandage. This little apparatus was arranged at the morning visit. During the day, the pain was less severe, and it altogether disappeared during the night. When I examined the state of matters next morning, I found to my great satisfaction that the corneæ had their normal colour, and excepting that the conjunctivæ were a good deal blood-shot, the eyes had completely returned to their natural condition. There was still some imperfection of vision; but the photophobia was gone. The treatment was continued for three days, at the end of which period the apparatus was removed. The general nervous symptoms had somewhat subsided: the stupor had nearly quite disappeared; and from that time the eyes were closed during sleep. Although during convalescence a severe attack of cholera supervened, and although that was succeeded by colitis, presenting some of the characters of epidemic dysentery, there was no return of the ocular symptoms.

The following case was observed by my friend and colleague Dr. Ambroise Tardieu. A man took scarlatina; and from the beginning of the attack had septic symptoms. The eyelids remained in a state of partial closure, and the lower segment of the cornea became softened, precisely as in our patient. Already, there was acute pain, photophobia, and a considerable affection of the sight. Suddenly, erysipelas of the face supervened, and simultaneously took possession of both eyelids, causing complete occlusion of both eyes for four days. Upon the erysipelas subsiding, the patient opened his eyes, when Dr. Tardieu was very pleased to find that the eyes, which he supposed lost, were perfectly restored to their natural state.

Although in this case, gentlemen, the disease was not the same as that now under our consideration, the complications were identical,

as were likewise the means employed to subdue them—means, however, which in Dr. Tardieu's case, nature herself applied. The treatment consisted in the occlusion of the eyelids, a measure simple and of easy application which I beseech you not to forget.

2. *Affections of the Larynx.—Necrosis of the Cartilages of the Nose.—Œdema of the Glottis supervening during Dothinenteria, and necessitating Tracheotomy.*

Gentlemen, early in March, 1858, a young man of eighteen, sent to Paris by a physician of Aix, was placed in our wards, to be treated for an affection of the larynx, which had necessitated tracheotomy. On admission, he was still using the tracheal tube, which he could not discontinue without being immediately seized with violent suffocative paroxysms.

The laryngeal affection was stated to have commenced eight months previously in the course of severe typhoid fever, which, according to the written statement forwarded by my colleague, had assumed the adynamic form, and had lasted for thirty days. Towards the end of the attack, the patient was seized with almost complete aphonia, which not only continued, but became aggravated at the commencement of convalescence. Respiration at the same time became more difficult: expiration was performed with sufficient freedom, but inspiration was laborious and accompanied by snoring and whistling sounds. There was no pain occasioned by making pressure over the larynx; and no œdematous swelling could be detected at the upper orifice of the air-passage, by introducing the finger far back into the throat. The dyspnœa was to a certain extent intermittent, or I should rather say was remittent, for it never quite ceased, although it diminished during the day, and increased during the night in severity.

The parts at the entrance of the larynx were cauterised, and two setons were inserted over the thyroid cartilage; but no benefit resulted from these measures. Eighteen days after the commencement of the laryngeal symptoms, asphyxia being threatened, it became imperative to perform tracheotomy to save the man's life. From the date of the operation, the patient's health became completely re-established, so that he came to Paris to get rid of the tracheal fistula, which he regarded as an irksome infirmity rather than as a malady. However, on his arrival at the Hôtel-Dieu, he

was still complaining of some embarrassment in his respiration; but this ceased from the time of our substituting a wider tube for the tube which he had been wearing.

I made several attempts to relieve him entirely from the necessity of using the tube, with a view to closing the wound in the trachea, and restoring entrance for the air by the upper orifice of the larynx; but on each occasion, the excitation of suffocative paroxysms showed me that the air-passages were not free. After having been six weeks in our wards the patient, discouraged, left the Hôtel-Dieu, that he might apply to others from whom he had better hopes.

Several of you may remember a case similar to, if not identical with, that now narrated, which came under our observation during last year. In it, however, you had the opportunity of following the laryngeal affection, step by step, so to speak, through all its phases. The patient was a young man of twenty. He was placed in bed No. 4 of St. Agnes's ward, labouring under one of the severest forms of dothinenteria, in which ataxo-adynamic symptoms predominated, and left behind them long-continued disturbance of the cerebral functions: during convalescence, he was in a sort of imbecile state.

During the third week of this young man's illness, I observed symptoms involving the respiratory organs: there was dyspnœa, but the most characteristic indications were hoarseness and cough. On examining the back part of the throat, I was enabled to ascertain that there was undoubtedly swelling of the epiglottis, and was led to suspect that it extended to the aryteno-epiglottidean folds—perhaps even to the mucous membrane of the larynx and the vocal cords. By means of regular insufflation several times a day of alum and tannin, there was a great amelioration, but not a complete cessation of the symptoms: under these circumstances, he asked, and was granted, his dismissal. Believing, however, that there was deep-seated mischief, localised probably in the cartilages of the larynx, I told you that there was necrosis of one of the cartilages, and stated my fears as to the fate of this young man: my impression was that in a few days he would return to the hospital in a worse condition, and requiring serious surgical intervention.

In point of fact, ten days afterwards, he did return. My prediction was fulfilled: the symptoms had assumed a formidable severity. Respiration was oppressed: expiration, which was whistling,

was less laborious than inspiration: the cough was exceedingly hoarse, there was an almost total absence of voice, and it was only by very great exertions that this unfortunate young man could make himself understood. Nevertheless, the oppression not having proceeded to the last degree, and there being no threatening suffocation, I made a new attempt to subdue the symptoms, using the same means which had at first been successfully employed. I prescribed insufflations of alum and tannin, but no abatement of the symptoms resulted from that treatment. With a view to give him a last chance before resorting to tracheotomy, I looked on the case as possibly one of syphilitic laryngitis, although only too well convinced of the accuracy of my diagnosis, and although I had hardly any hope of obtaining more favourable results. Profiting, therefore, by the time granted me, by the want of urgency in the symptoms, I administered preparations of iodine; but under this treatment, the œdema of the glottis increased, and, on the 18th July, there was a renewal of the threatening of suffocation: and from asphyxia being imminent, it became imperative to resort to tracheotomy. The operation was performed late in the evening by the *interne* on duty, M. Warmont, a distinguished hospital pupil, and next morning, at the visit, I found our patient in good spirits, and asking food.

Some weeks afterwards, he finally left the hospital, breathing freely by the wound in the trachea, thanks to a tube of very large calibre which had been inserted. When he wished to speak, he closed the tracheal opening; and though his voice was still very hoarse, it was easily heard. He afterwards came to see us occasionally, and from time to time we have had accounts of him. Two years after the operation, he was still breathing through the tube, which he could not close completely without being threatened with suffocation. His general health was excellent: at his last visit, we found that he had gained a considerable amount of flesh. He had resumed work as a coppersmith. To render his infirmity more supportable, and for the purpose of concealing it as much as possible, he had invented a somewhat ingenious apparatus: he had adapted to his tracheal canula a long caoutchouc tube, which passing under his neckerchief and descending along his body, opened in the side pocket of his trousers. When he wished to speak, he put his hand into his fob, without, as formerly, having to put his finger to his neck. He was, however obliged to renounce this contrivance, as it interfered with the freedom of his breathing. Some days ago, I

learned that he continued in the same state of health, but was still wearing the tracheal canula.

Cases of œdema of the glottis, similar to those now related, occur not unfrequently in the course of, and during convalescence from, severe continued fevers. I say *severe fevers*, because they are observed not in dothinenteria only, but likewise in scarlatina and small-pox. At present, to speak only of what occurs in putrid fever, I may mention that my lamented colleague Sestier, in 274 cases which he collected, gives 10 cases in which œdema of the glottis supervened during convalescence from typhoid fever. These cases were not encouraging, for they all proved fatal: in five of them, tracheotomy was resorted to.[1]

In contrast with these unfortunate cases, I can quote others of a more favourable character, in addition to the two which I have already related. In the *Gazette Hebdomadaire* for August 1859, you will find a report in relation to this subject, by Dr. Charcot, of cases published in Germany, in which the proportion of successful cases was great—seven in nineteen.

What ought most to surprise you, gentlemen, is that cases of œdema of the glottis consecutive to dothinenteria are not more numerous, seeing the frequency of the lesions under the influence of which this affection may be produced.

I have related to you the only two cases of this affection which I have met with as sequels of dothinenteria since I have occupied this clinical chair; so that I have had no opportunity of verifying by dissection the appearances which others have seen in similar cases. But that I may make my remarks on this subject as complete as possible, I will quote three cases, the first from my former pupil Dr. Louis Genouville, the other two from Dr. Second-Ferréol.[2]

Dr. Genouville's case was that of a person admitted to the Hospital of St. Anthony, to the wards of my colleague Dr. Bergeron. The patient was at the end of a severe attack of adynamic putrid fever, when, a few days after his arrival, he was seized with a suffocative paroxysm which imperatively demanded tracheotomy. On the second day after the operation, when he seemed sufficiently well to be allowed, at his own request, to discontinue the tracheal tube,

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[1] Sestier:—La Bronchotomie dans le cas d'Angine Laryngée Œdémateuse. [Archives Générales de Médecine, 1850.]

[2] Bulletins de la Société Anatomique, for 1857 and 1858.

he was suddenly carried off by a suffocative attack. On opening the body, the mucous membrane of the larynx was found to be gangrenous, and this condition extended back to behind the ventricles: the arytenoid cartilage was entirely destroyed: the inferior constrictor muscles of the pharynx and the crico- arytenoid muscles were sphacelated. The bronchial glands were black, and exhaled the characteristic odour of gangrene. In the situation of the ileo-cæcal valve were seen the morbid appearances which belong to dothinenteria.

In this history, there is nothing said of œdema of the glottis, but I nevertheless deem the case deserving of mention, for gangrene of the larynx and necrosis of the cartilages are lesions associated with œdema of the glottis, although gangrene is not so commonly met with as other morbid alterations of which there are notices in the cases reported by Dr. Second-Ferréol, which I am now going to relate.

One of his patients, a man of twenty-two years of age, had had a seriously complicated attack of ataxo-adynamic putrid fever: he had gangrenous sloughs over the sacrum, and the surfaces to which blisters had been applied on the calves of the legs were sphacelated. On the 22nd December, he went into La Pitié Hospital, under the care of my excellent friend and colleague Dr. Noël Gueneau de Mussy, and at the end of January was convalescent: his wounds, however, were not cicatrising, and numerous subcutaneous purulent collections formed, which had to be opened. He had been subject to loss of voice before his typhoid fever, and had a return of this affection during the convalescence. He was not only voiceless, but had likewise difficult respiration, and the inspiration was whistling, particularly during sleep. By cauterising the superior orifice of the larynx with nitrate of silver, these symptoms were temporarily moderated, but again increased when speaking was attempted. They soon became of such a character that suffocation was imminent, and tracheotomy necessary. The patient died during the operation.

The autopsy showed a slight œdematous infiltration of the arytenoepiglottidean folds: both vocal cords were swollen, and presented slight superficial erosions. The larynx contained a large quantity of muco-purulent fluid, which, when pressure was made on the cricoid cartilage, flowed out through a fistulous opening, situated posteriorly and a little to the left side of the cricoid cartilage. This opening communicated with a collection of pus, bounded on one

side by the sterno-thyroid, and crico-thyroid muscles, and on the other by the mucous membrane of the larynx. A great part of the left half of the cricoid cartilage had disappeared. There was a loss of substance, very irregular in shape, constituted by the destruction of the superior circumference of the ring, and involving three fourths of its height. On each vocal cord there was observed a small club-shaped polypus with a slight pedicle, and about the size of a lentil. These two small polypi, attached opposite to each other, were floating loose; and by falling down over the orifice of the glottis they could very well close it completely. These polypi may not have much complicated the necrosis of the larynx, but they accounted for the aphonia to which the patient was liable prior to his attack of typhoid fever.

The subject of the second case was a young man of seventeen years of age, who likewise was received into Dr. N. Gueneau de Mussy's wards with typhoid fever. The attack, apparently slight at first, was marked, during the second week, by adynamic symptoms of, however, no great severity. On the morning of the eleventh day after his being received into hospital, he showed signs of excitement: the voice was hoarse, and sounded as if it were stifled: inspiration was noisy and whistling, while expiration was more easy. Frictions with croton oil on the neck, cauterizations of the superior orifice of the larynx with a solution of nitrate of silver in three times its weight of water, applied by means of a sponge, did not stop the symptoms, which indeed, by the evening, had become considerably aggravated. Redness was then visible on the isthmus faucium, and when the finger was directed to the orifice of the larynx, the epiglottis was distinctly felt to be swollen, so as in shape to resemble a round cushion with a central hole, and to extend towards the aryteno-epiglottidean folds. The patient died during the night.

At the autopsy, the isthmus faucium had a permanent bright red colour, and the glands in that situation were swollen, as were likewise the papillæ circumvallatæ of the tongue. There was a large œdematous infiltration, with vascularity of the sub-mucous cellular tissue, situated at the orifice of the larynx, around the epiglottis: in form somewhat spherical, and resembling a cherry, it extended into the interior of the larynx, and over the vocal cords, which were eroded at their free margins. At the anterior horn of the left arytenoid cartilage, at the insertion of the vocal cord of the same side, there was a small, oval, greyish erosion, with fringed irregular

edges, which led to a deposit of concrete pus in the sub-mucous cellular tissue of the *gouttière des boissons* from two to three centimeters long by one and a half broad. The arytenoid cartilage presented to the eye no appreciable alteration, but its anterior apophysis was found denuded at the bottom of the crosion already described.

The necroses of the larynx, which in the cases now detailed gave rise to the affection improperly termed œdema of the glottis, have, (following a mechanism which I will afterwards explain) as their starting-point ulcerations which are almost always met with in this region in dothinenteria, as has been pointed out by Chomel. The term œdema of the glottis, I call improper, because the affection really occupies the glottis itself less than the aryteno-epiglottidean ligaments, that is to say, than the superior orifice of the larynx. I will afterwards return to this point, when I come to consider in a special manner the history of œdema of the glottis. These laryngeal affections, described with the greatest possible care by Louis, exist so constantly, that that physician gives ulceration and partial destruction of the epiglottis as one of the secondary anatomical characters of dothinenteric fevers, placing them in that category along with ulcerations of the pharynx and œsophagus. So characteristic are these appearances in his opinion that he says :—"If found on examining the body of one who has died from an acute disease, they will establish with nearly perfect certainty, and without going any farther, that the affection was typhoid fever."[1]

The cartilages of the nose may be affected by dothinenteric necrosis. We are indebted to one of our accomplished hospital colleagues Dr. Henri Roger for the account of a very curious case of necrosis of the cartilage of the septum. It occurred in a young man, who, when convalescent from very severe typhoid fever, attracted the attention of his physicians by an unusual phenomenon: he had a perforation of the nasal septum, through which he could make his two fingers meet. There was shown to exist, in fact, an ulceration with perfectly rounded edges, bleeding at some points, and at others covered with crusts which circumscribed a complete destruction of part of the septum, which was found to present a perforation of the size of a five centime piece. The cicatrisation of the ulcerated soft parts was soon completed, but the perforation of the septum remained. It was of an oval form, and situated three millimeters above the ori-

[1] Louis :—Recherches sur la Fièvre Typhoïde, p. 321. Paris: 1841.

fice of the nostrils. The only functional disturbance which it occasioned was a snuffling sound of the voice, which at first was considerable, and then gradually diminished. Dr. Henri Roger very properly classes this case with those of necrosis of the larynx. It is, however, much more rare, for neither Rokitansky nor Griesinger mention it. There is no example of it quoted by Cruveilhier; and I have never seen one.[1]

These lesions admit of explanation, without the necessity of supposing a special localisation of the disease analogous to that which takes place in the intestinal canal. There always exists in dothinenteria, in a degree more or less marked, that irritation, that catarrhal condition of the respiratory passages to which I have called your attention: and on the other hand, it is known how much in this fever the tendency to ulceration shows itself, wherever there is inflammation or even mere irritation of the mucous membranes. You have not forgotten, I presume, what I told you, to the effect, that in septic diseases the mucous membranes become the seat of half-active, half-passive congestions, which readily proceed to inflammation and even to sphacelus, a fact which explains the ophthalmic affections of which I have spoken—the coryzas, sore throats, inflammations of the genitals, and laryngitic attacks which, in fact, all belong to the common cortège of septic fevers. With this fact in your minds, you will not be astonished to meet with a tendency to ulceration, a tendency which is sometimes found where it would hardly be looked for. For example, Dr. Chareot had a case in which there was ulceration of the gall-bladder.

It may, therefore, be said that there is a sort of ulcerous diathesis in dothinenteria; but independent of this diathesis, of this dyscrasia of the blood, which constitutes one of the characters of putridity, ulceration is one of the consequences of inanition, as has been demonstrated by the beautiful experiments of Chossat.[2]

Likewise, there are no circumstances under which ulcerations of the larynx, nose, pharynx, œsophagus, &c. are more common than when the dothinenteria has been of the putrid form, adynamic, or when the course of the disease has been protracted, or when the diet of the patient has been kept too rigorously low. I intend, as I have

[1] H. Roger:—Bulletin de la Société Médicale des Hôpitaux de Paris. T. iv, p. 427.

[2] Chossat:—Recherches Expérimentales sur l'Inanition. Paris: 1843.

already said to reserve my remarks on the mechanism of œdema of the glottis, as I propose to devote an entire lecture to the consideration of that affection.

There still remains a question for our consideration. When once œdema of the glottis has been ascertained to exist, ought tracheotomy to be immediately performed? Ought we to wait for violent suffocative paroxysms? Ought we to wait till asphyxia is imminent?

You have seen, gentlemen, what I did in the case which came under your own observation. At the first examination, I diagnosed œdema of the glottis: paroxysms of suffocation occurred, but I still postponed opening the trachea, and instituted treatment, which, although I was not sanguine as to its success, nevertheless gave a chance of obviating the necessity of operating. I held myself in readiness for every eventuality: I caused the patient to be closely watched, resolving to perform tracheotomy whenever, from the suffocative fits becoming frequent and violent, asphyxia should become imminent. The young man was not operated on till it would have been dangerous to have waited longer. Such in my opinion is the proper course to follow; for after balancing the indications for and against opening the trachea in œdema of the glottis, I would say that it is wrong to wait till asphyxia has proceeded so far as to render death imminent. To wait the arrival of that critical moment would be to run the risk of failure from the patient sinking during or immediately after the operation, in consequence of his having fallen into a state of stupor and collapse from which it might be difficult to rouse him. On the other hand, it would be equally wrong to be in a hurry to operate as soon as severe and well-marked attacks of suffocation had occurred, and it would be equally objectionable to operate as soon as œdema of the glottis had declared itself; for under both of these conditions, there are cases in which recovery takes place without tracheotomy. These recoveries seldom occur when the œdema depends upon necrosis of the cartilages of the larynx, because the necrosed portions with hardly an exception, absolutely require to be eliminated, and this elimination cannot take place till repeated inflammations have been excited; and under their influence infiltration of the aryteno-epiglottidean folds is produced. Sometimes, also, the vocal cords are infiltrated, as I will afterwards explain to you.

Nevertheless, gentlemen, it is quite possible for this elimination to take place without involving these consequences. When this occurs,

recovery is the result of the unaided efforts of nature, as is exemplified by the following case, which occurred in the practice of my colleague Dr. Hérard, physician to the Lariboisière Hospital.

A young woman of twenty-two had a very tedious convalescence from typhoid fever. After the lapse of about three months, she was suddenly seized with severe dyspnœa accompanied by loss of voice. From that time she had had occasional attacks of suffocation, during which the inspiration in particular was exceedingly painful. Six months later, the aphonia was almost absolute. The few sounds emitted by the patient were hoarse, guttural, and accompanied by a little hissing noise. Respiration was very much oppressed: inspiration, which was noisy and somewhat wheezing, brought the muscles of the chest into strong action. The patient had at the same time a frequent and very distressing cough, but it did not come in fits: the sound of the cough was very deep. There was a little sero-mucous expectoration slightly streaked with blood. The patient's general condition was good; her countenance had a natural appearance; she was plump; and had regained her strength.

Examination of the respiratory apparatus only furnished negative signs. On applying the stethoscope over the larynx, a very decided whistling sound was heard: it was very rough during both inspiration and expiration, but particularly during inspiration. Externally, there was no sign of structural change in the larynx—no cicatrix, no fistula, no crepitation on pressure—nothing to indicate lesion of the cartilages. On introducing the finger into the throat, it was impossible to detect any increased volume of the aryteno-epiglottidean folds; and a sound was easily introduced into the larynx. Some days later, the patient experienced more discomfort in the larynx: she thought that she felt a moveable body which occasionally got across the throat. All at once, during the evening, she was seized with a real and very severe paroxysm of suffocation; and after a violent fit of coughing, she ejected by the mouth two small osseous sequestra.

On the immediately following days, the aphonia remained as before. The cough was distressing, and had all the characters of laryngeal cough. The larynx, when pressed, was slightly painful, but unless pressure was made, there was no sensation of pain in it worth noticing. At the end of a month, slight improvement showed itself. There was less cough; and the vocal sounds, though still very incomplete, were uttered with more ease.

At the end of a residence of seven months, the patient left the hospital. Her general health was then unexceptionable: utterance was nearly natural, though the voice was still rather hoarse, guttural, and deep. There was no cough, and no pain in the larynx, even on pressure. The state of the chest continued satisfactory.

In conclusion, when œdema of the glottis supervenes during convalescence from, or in the course of, dothinenteria, after trial has been made of the available therapeutic resources of medicine, such as insufflation of alum or tannin, cauterizations with nitrate of silver, and, when practicable, scarification of the œdematous aryteno-epiglottidean folds, we must be ready to perform tracheotomy —and that early rather than late—that is to say, when the suffocative paroxysms have become frequent and of increased severity and duration, and the respiration more embarrassed in the intervals between the fits. The more the patient has been reduced by the antecedent malady, the less delay ought there to be in operating.

3.—*Sloughs.—Erysipelas.—Colliquative Suppurations.—Paraplegia Consecutive to Infiltration of Pus into the Spinal Canal producing Inflammation and Suppuration of the Spinal Marrow.*

Gentlemen, the tendency to sphacelus, which is one of the characters of the condition to which the name *putridity* has been given in severe fevers, is never more decided than in adynamic dothinenteria. It is the principal cause of the sloughs which you have so often observed in our patients. They occur chiefly in parts subjected to continuous pressure, such as over the sacrum, great trochanters, and, as Chomel has noted, sometimes even, over the occiput. Continuous pressure, then, contributes its share in causing mortification of tissues: the contact of fæces, and urine, by constantly soiling the parts, undoubtedly also assists in producing that result. It is necessary, therefore, that the patients should be kept exceedingly clean, and that their position should be frequently changed, so as to prevent the injurious consequences of pressure continued too long on the same part of the body. With a view to obviate the inconveniences which arise from the roughness occasioned by folds in the sheets on which the patient lies, napkins of vulcanized Indian rubber have been invented for placing under the seat: they are stretched across, and fixed at each side of the bed. By this contrivance, a perfectly smooth and soft surface is obtained: and these napkins have, moreover, the

advantage of being easily kept clean, as that can be accomplished by wiping them with a wet sponge. When one has not at command an apparatus of this description, the pelvis of the patient may be wrapped up in a chamois skin, such as is used for washing carriages: it is fixed in front, so that whatever position the patients get into, they are always in contact with a smooth soft surface. These chamois skins can be obtained anywhere; and they are very easily washed. Another plan suggested—a plan you saw me put in practice with one of our male patients—consists in making the patients sleep on straw, in accordance with the system adopted with the *gâteux*[1] of the Bicêtre and Salpêtrière. The straw absorbs the fluid part of the excrementitious matters, which by their contact would have irritated the skin; and in this way one of the causes of gangrene is removed.

Unfortunately, these different measures often prove insufficient; for, as I told you, the principal cause of sloughing in dothinenteric patients is the tendency to mortification which belongs to the disease. How great this tendency is is seen by the facility with which surfaces to which blisters have been applied become gangrenous, even when the blisters have been applied to the front of the chest and insides of the thighs, surfaces on which there can be neither pressure, nor soiling by urine or fæces. It also often happens that pustules of ecthyma in different parts of the body, and the bites of leeches become the starting point of sloughs of greater or less size, and of more or less depth, irrespective of pressure or irritation from excrementitious matter, causes to which some physicians—as I think erroneously—attach very great importance.

The sloughs which occur so frequently in dothinenteria sometimes become exceedingly serious complications.

They may occasion *erysipelas*, which, developing itself around a slough, may spread widely, invading a great part of the skin, or exciting febrile action, which exhausts the patient, already much reduced by the long duration of the putrid fever.

From their number, extent, and depth, the sloughs are in themselves serious complications; for when they do not lead to a fatal termination, they exceedingly retard convalescence. Gangrene often

[1] See p. 329.—The *gâteux* of the Bicêtre, and the *gâteuses* of the Salpêtrière are the patients in the respective hospitals who, from mental imbecility, or paralysis of the sphincters, pass their excrements either without regard to decency, or involuntarily.—Translator.

proceeds from the skin to the cellular tissue, then reaches the muscles, and destroys them. Its destructive power affects even the bones, which it leaves denuded and necrosed. Under these circumstances, there are large deep ulcerations yielding a putrid sanguinolent discharge; and ere long, life is terminated by the vain attempt of the organism to struggle against profuse and constant suppuration.

Moreover, the extensive ulcerations of the skin produced by the sloughs—as well as boils, carbuncles, and buboes—may lead to the absorption of putrid or purulent matter. Professor Andral mentions a case in which numerous metastatic abscesses supervened after an attack of small-pox.[1]

It is natural to suppose that in some cases the dothinenterie ulcerations of the intestines may become the starting point of purulent fever.

On the 16th December, 1861, a case of this description was observed at the anatomical theatre of the Hotel-Dieu. The autopsy to which I refer was that of a man of twenty-seven, who died, in the wards of my colleague Dr. Hortcloup, during the seventh week of typhoid fever. The symptoms which the man had latterly presented were such as are frequently observed in the last week of dothinenteria, just when convalescence ought to be beginning, and which consist in an exacerbation of symptoms, and the appearance of new typhoid and ataxic complications.

When the intestines were being removed from the body, that they might be opened, it was observed that the most fleshy part of the left psoas muscle was swollen out into a tumour. When this was cut into, chocolate-coloured pus spurted out, the quantity evacuated being estimated at nearly 100 grammes. Dr. Horteloup's *interne*, who made the autopsy, informed us that the patient had never presented the signs usually attributed to psoitis. I at once remarked that the psoas abscess must be metastatic, and that from appearances there were numerous similar abscesses in the lungs. The lungs were in fact studded with small purulent collections, such as are commonly seen in the fever dependent upon the absorption of pus: similar purulent collections were found in the liver. We discovered nothing to explain the fact of purulent absorption, except extensive dothinenteric ulcerations in the lower part of the ileum.

[1] ANDRAL:—Clinique, T. I. p. 278: 3me édit.

A similar case, in which recovery took place, is reported by MM. Castelnau and Ducrest.[1]

There is still another complication of dothinenteria, which, although I have not seen it, may be met with. I allude to an inflammation of the spinal marrow and its membranes, which has a slough over the sacrum as its starting point. You have seen a case of this description, though not in connection with putrid fever. The case, however, naturally claims notice in relation to the point now before us. Similar cases are also described in classical works.

My colleague Professor Nélaton remarks, in his "*Eléments de Pathologie Chirurgicale*," that, as a consequence of the sloughs which form over the sacrum, "there sometimes occurs an exceedingly serious complication, easily explained by the anatomical relations of the parts. The lower outlet of the sacral canal is closed by a fibrous band extending from the sacrum to the coccyx; and this band is itself involved in the mortification. The spinal dura mater and arachnoid are also perforated, and a putrid sanies flows into the arachnoid cavity, producing all the symptoms of spinal meningitis, and ere long causing death."

This statement is quite a description of the case of the patient whom you lately saw in bed No. 8 of St. Agnes's ward. Having presented the signs of acute myelitis, with sloughs over the sacrum, and typhoid symptoms, she sank delirious after an illness of six weeks. On examination after death, the entire posterior aspect of the space between the trochanters was found to be occupied by a slough. The sacro-coccygeal ligament was destroyed: the vertebræ were to a considerable extent denuded: and a probe could be introduced into the sacral canal. The membranes within the sacral canal were reduced to a greenish pulp, and it was impossible to recognise the arachnoid. There was a great quantity of pus as high up as the seventh dorsal vertebra: it seemed to have originated in the slough of the integuments. Up to the seventh dorsal vertebra, the membranes of the spinal cord were thickened, but above that, they were in a normal condition. Down to four centimeters above its termination in the cauda equina, the spinal cord, throughout its whole extent, was unaltered by any morbid affection. There, it was

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[1] Castelnau et Ducrest:—Recherches sur les Abcès Multiples comparés sous leurs différents rapports. Paris: 1846.

in a softened condition, and under a jet of water it became disintegrated. There was no lesion of the encephalon.

This was evidently not a case of dothinenteria: but you can very well understand that consequences similar to those now described might follow from sloughs arising in connection with dothinenteria, and it is on that account that I have related this history.

4.—*Spontaneous Gangrene of the Limbs.*

Among the local complications which may supervene during the course, and in the decline, of dothinenteria, one remains to be mentioned, which is very much rarer than any of those to which I have as yet directed your attention. I refer to spontaneous gangrene of the limbs, an affection to which in recent times particular attention has been paid. I have not seen any cases of this complication; but you will find some reported by most trustworthy physicians. Among others I would mention those which Dr. Gigon of Angoulême has made the subject of a paper entitled "*Note sur le Sphacèle et la Gangrène Spontanés dans la Fièvre Typhoïde;*"[1] and two cases read, on the 14th January, 1857, before the Hospitals Medical Society, by Dr. Bourgeois of Etampes. To them I will add the following case, communicated to me by my *chef de clinique*, Dr. Leon Blondeau, who saw it when *interne* at the Children's Hospital.

A boy of ten years of age was admitted, on the 3rd December, 1847, to the wards of Baudelocque. He fell ill at the beginning of November; and from the accounts of his illness given by his family, there could be no doubt that he had had adynamic putrid fever.

On admission, that of which the little patient most complained, was great pain in the right leg, in which, however, neither change of colour nor swelling could be seen. Baudelocque had the idea that the pain was caused by the formation of one of those deep-seated phlegmons which are sometimes met with in severe fevers: he, therefore, prescribed mercurial inunction over the seat of pain. Ten days afterwards, however, gangrene began to show itself in the foot. The boy was then taken into the surgical wards of M. Paul Guersant.

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[1] Gigon.—See *Union Médicale* for 24 and 28 September, 1861.

[2] Bourgeois.—See *Archives Générales de Médecine*, for August, 1857.

The entire surface of the right foot was of a purple colour which was deeper on the internal aspect, from the tip of the great toe to the first line of tarsal bones. This violet hue, which might be compared to that of a nævus, extended to the third interosseous space of the metatarsus. Upon the ankle and internal malleolus, the veins were marked by greenish brown subcutaneous lines, like those seen in putrefying dead bodies. The feeble heat still retained by the parts in this mortified condition was more attributable to precautions taken to keep the foot wrapped up in flannel and wadding, than to the temperature of the foot itself.

There was complete absence of pulsation in the right tibial artery. On the internal and posterior surface of the right leg, at the junction of its upper and middle thirds, and in the course of the artery, a large hard cord was felt: it was felt most distinctly at the tibial insertion of the gastrocnemius internus. The slightest pressure over that place occasioned acute pain. On that side of the limb, the pulsations of the popliteal artery could not be detected, but the pulsations of the crural artery had the same force, frequency, and rhythm as in the left thigh.

The inguinal glands were swollen: those of the right side were the largest, and the most painful on pressure; and over them the skin was of a pale red colour.

The pulse at the wrist was small, very compressible, and 100 in the minute. The patient was in a state of great excitement, and seemed to be suffering much pain.

Six leeches were applied to the seat of pain in the leg, with apparently the result of giving some relief, by diminishing the acuteness of the constant pain: but the sphacelus went on increasing, the livid colour of the skin became of a deeper shade, and spread itself over a larger surface.

Tonic regimen and tonic medicines (including cinchona as the chief) were prescribed. The limb was at the same time kept enveloped in opiated poultices.

On the 16th December, three days after the boy's admission into M. Guersant's ward, there was a complete demarcation between the gangrenous and non-gangrenous parts. Next day, the vascular cord could not be felt; and the fever had subsided. On the 29th December, the gangrene seemed to be perfectly circumscribed in the region which I have just described: it appeared to be very superficial, and not to go deeper than the skin. Over the malleoli, and

in particular over the malleolus externus, some brownish lines were visible, formed by veins gorged with stagnant blood. The boy complained of very acute pains in the affected parts, which were, in general, most severe at night. The pains in the legs had completely ceased. The general condition of the patient was very satisfactory. Notwithstanding the severity of the lesions, the boy—after having had his foot amputated—perfectly recovered, and left the hospital on the 17th May 1848.

In this case, gentlemen, the gangrene, which supervened in the wane of an attack of dothinenteria, undoubtedly originated in obliteration of an artery. The question, however, still remains, whether the arterial obliteration was the consequence or the cause of arteritis, the existence of which arteritis was characterised by the presence, in the course of the artery, of an indurated cord, painful to pressure. My own opinion is that in this case, as well as in the two cases of Dr. Bourgeois of Etampes which I am about to relate, as likewise in cases published by Dr. Gigon of Angoulême, and Dr. Patry of St. Maure, the primary cause of the gangrene was the formation of a clot-plug, this clot having been either formed *in situ*, constituting the thrombus of Virchow, or being a migratory clot, the embolus of the German professor. This clot, acting as a foreign body on the inner surface of the vessel had excited inflammation in it, which inflammation in its turn had produced plastic products, and in this way the stoppage in the artery had been increased, and its obliteration had at last been completed. The subject of the obliteration of vessels by self-made clots [*caillots autochthones*]—to use the current term of the day—is of so much importance that I must devote one or more of our meetings to its consideration. It is, moreover, so often met with in practice, that we shall certainly have an opportunity of returning to it; and I, therefore, reserve our special study of it and its bearings upon clinical instruction.

Let us now return to the subject more immediately before us. The cases of Dr. J. Bourgeois of Etampes are even more interesting than the case I have just related to you, from the circumstance that in them the sphacelus was deeper and more extensive, in one case involving the whole of the leg, and in another case involving both legs, causing in both instances amputation of limbs by the unaided efforts of nature.

In the young girl, the subject of his first case, there came on, in

the wane of a mild attack of dothinenteria, acute pain in the right leg, which was neither red nor swollen, but in which there was a notable diminution of motor power and sensibility, and a reduction in temperature: after a few days, the leg was quite cold. The skin soon assumed a colour which at first was dark grey, then copper-red or brick-red, and quickly afterwards became clear violet with numerous streaks. The physiological sensibility of the leg was so completely extinct that a pin could be pushed in its whole length without causing any annoyance. An irregularly fringed line, separating the obviously mortified from the still living parts, extended from the tuberosity of the tibia to the upper third of the calf, and encircled the leg. The integuments losing their violet hue, became more and more slate-coloured. At the point of contact of the healthy and diseased parts, a deep ulceration formed, from which there was every day a flow of greyish, very fetid pus. The knee was slightly painful: in the thigh, there was no pain. The toes and the foot dried up, but the leg, well nourished, long retained its natural size. The patient's condition, however, improved from day to day. She was kept on restorative diet, and tonic medicines. The leg was covered with powders of an absorbent, aromatic and septic character. The soft parts very soon separated: the living flesh retracted, leaving between the healthy and mortified parts a space of from four to five centimeters, in which were seen the two bones of the leg, perfectly denuded, dry, and almost white. To rid the patient of a fatiguing weight, and a source of exhalations more or less injurious, the bones were sawn through at two centimeters from the wound, which had a sound red appearance, and was even beginning to cicatrise at its edges, and to contract.

Twenty days afterwards, two small rings of bone were detached; and then cicitrization was soon completed. The girl left the hospital, having regained her fresh looks and plump appearance. The stump was exactly similar to stumps obtained after amputations performed at a selected spot, and in the best possible manner, according to the rules of art.

Dr. Bourgeois states that he did not find any swelling in the course of the great vessels. It is probable, however, that in this, as in the other case I related, the gangrene was the consequence of obliteration of the popliteal artery. This remark is applicable also to Dr. Bourgeois' other case, which I am now going to narrate. No painful cord caused by the obliterated artery was observed, al-

though it was noted that there was an entire absence of pulsation in the arteries of the mortified limb. Here is an abstract of the case.

The patient was a boy of twelve years of age. At about the third week of a moderate attack of mucous fever, and just when convalescence seemed to be beginning, he was seized in both legs with very acute pain, which was most severe in the right: the pain was increased on pressure, but was unaccompanied by any swelling. There was a decrease of temperature in the legs: the thighs presented nothing abnormal. After two or three days, the surface of the right limb assumed a greyish tint, which passed into a copper-red, traversed by numerous streaks. The pain was most intense below the tibio-femoral articulation. The integuments had lost their sensibility, and the paralysis was complete.

A deeply indented line had separated the living from the sphacelated parts. Scarcely a week later, similar changes were occurring in the left leg. The patient was admitted to the hospital at Etampes, where Dr. J. Bourgeois observed the progress of the malady from day to day.

The boy died after nine months of dreadful suffering. The natural separation of the dead parts was, you observe, waited for. Although it was obvious that there were some objections to thus allowing the dead parts to remain, it was supposed that as they were perfectly dry, and far separated from the stump, the evil consequences could only be very slight. It is to be regretted that there was no autopsy. Had an examination of the body been made after death, there would probably have been found not only an obliteration of the vessels of the thigh, the pulsations of which were felt during life, but of the popliteal arteries; and thus a complete explanation would have been afforded of the spontaneous gangrene of the limbs, without the necessity of having recourse to the very questionable hypothesis of disturbance of the functions of the nervous system, or without requiring to invoke, with Dr. Bourgeois, a metastasis, of which really I can form no conception.

Two of the cases observed by Dr. Gigon of Angoulême presented a remarkable similarity to those which I have already laid before you, with these differences, however, that it was not an inferior extremity which was sphacelated, but the right superior extremity, and that the gangrene was moist and not dry. This latter difference is explained by the affected part being different, and—as the autopsy

showed—by the vascular obliteration being in the veins and not in the arteries.

"In two patients," says Dr. Gigon, "suffering from very severe typhoid fever with symptoms of putridity of the humours, there arose in the right arm, considerable swelling, which was greatest in the neighbourhood of the axilla. The hand and fore-arm were least swollen. The arm was at first red, and painful to the touch, and then it swelled to twice its natural size: its skin became purple, its temperature fell, its sensibility became obtuse, numerous phlyctænæ (filled with a yellow or reddish fluid) showed themselves, and some brown patches appeared below the shoulder and towards the elbow. Incisions, large and deep, made both before and behind, throughout a great part of the length of the arm, were hardly felt by the patient: the subcutaneous cellular tissue was deeply gangrenous, and infiltrated with pus. Shreds of gangrenous cellular tissue became detached, along with portions of aponeurosis, and there was a discharge of sanious, reddish, putrid purulent matter. The symptoms of general prostration increased greatly at the same time; and led to speedy death. In one case, eight days, and in the other nine days, elapsed between the appearance of the swelling and the fatal issue. The gangrenous affection seemed to be much more serious in the superior than in the inferior extremity. The autopsy showed that in both cases there had been inflammation of the superior portion of the subclavian vein, with formation of a complete clot-plug, which adhered to the inside of the vein: the clot was of pretty firm consistence, of a rose colour, and acted as a stopper. Less tenacious ramifications of the clot extended into neighbouring veins, such as the superior scapular, the axillary, the cephalic, and external mammary: in the subclavian vein, the internal surface was of a very deep red, this colour, as the vessel advanced, diminishing towards the ramifications: the venous coats were more friable than natural, and thickened. The mechanical obstacle to the circulation was, in my opinion, the cause of the moist gangrene of the arm."

Dr. Patry of St. Maure[1] reports the case of a patient who had simultaneously dry and moist gangrene in different parts of the same inferior extremity. The dry gangrene occupied the foot and leg, which were black, dried up, and shrunken: the moist gangrene

[1] Patry:—Gangrène des Membres dans la Fièvre Typhoïde. [*Archives Générales de Médecine, février et mai*, 1861.]

was spread over the whole thigh, which was purple, swollen, and denuded of epithelium in several places. On examination after death, the crural artery was found to be increased in size, and completely obliterated at its upper part by black clots, which broke down easily, and were not adherent to the interior of the artery: in the popliteal portion of the vessel, the clots were friable and harder, and some of them were adherent to its inner surface: the arterial coats were red, injected, thickened, and had lost their elasticity. The crural vein was obliterated by consistent black clots, which, however, did not adhere to the internal tunic: its coats were thickened, injected, of a deep red colour, and did not collapse when cut. The dry gangrene of the foot and leg is evidently explained by the obliteration of the popliteal artery, which took place before the obliteration of the crural artery, in which the clots were more recent, softer, and non-adherent. The moist gangrene of the thigh was equally the result of the obliteration of the crural artery and the crural vein: there was a combination of gangrene arising from suspension of the arterial circulation, and of œdema from arrest of the venous circulation.

Dr. Patry has also given the very curious history of a young man who, at the twentieth day of an adynamic dothinenteria, suddenly felt a very acute pain, proceeding from the left angle of the inferior maxilla to the parotid and temporal regions. In forty-eight hours from the commencement of this pain, the left ear sphacelated. Subsequently, the parotid and temporal regions became cold, and assumed a purple colour, while bullæ, filled with a blackish fetid fluid, appeared on their surface. Four days later, the sphacelus had extended to the forehead, to both eyelids, and to the cheek, as far as the commissure of the lips. In spite of these frightful disorders, the patient survived twelve days. At the autopsy, the external carotid artery was found to be obliterated by two clots, one of which, situated in the upper part of the vessel, was hard, friable, colourless, and adherent; and the other, more recent, and striated lower down, was of a deep black colour, and tolerably consistent. In the situation of the upper clot, the arterial canal was injected, thickened, and more easily torn than natural: the inner coat had lost its smoothness and transparency. The jugular veins were in a normal state.

In connection with this case, Dr. Patry mentions that he saw, in 1843, in the hospital practice of Dr. Charcellay of Tours, a man who was, during dothinenteria, attacked with gangrene of the

whole of the left side of the face, and who was for five months a sufferer from this complication. Both the right and left superior alveolar arches were destroyed, and the patient was obliged to wear a bandage over the left side of the face, so as to conceal the hideous enlargement of the mouth.

To complete this series of abridged cases, it is necessary to add, that the typhoid fever in which the complications arose was characterised by finding, during life and after death respectively, the symptoms and lesions peculiar to that disease—a fact which both Dr. Gigon and Dr. Patry are careful to state. If obliteration of an artery or vein is the undoubted cause of sphacelus of an entire limb, or of a great part of a limb, arising in the course or at the end of dothinenteria; if this obliteration of vessels, if the arteritis or phlebitis which have been active agents in producing it, have for starting point a sanguineous clot, the formation of which (as I remarked when speaking of embolism) ought to be attributed to a peculiar dyscrasia of the blood met with in other diseases very different in their nature from typhoid fever—it is also indisputable that the mechanical cause acts much more energetically in dothinenteria, from the circumstance that a notable tendency to mortification of tissues is one of the characteristics of the putridity at times so strongly marked in that fever.

LECTURE XVI.

TYPHUS.

An Infectious Disease like Dothinenteria.—Differs from Dothinenteria in the Absence of Intestinal Lesions.—The two Fevers are distinguished from each other by the Aggregate of the Symptoms, and their Thermal Variations.

Gentlemen:—Although, from the nature of the instruction which it is my duty to impart to you, there is a propriety in confining myself to the consideration of the clinical cases which come under your observation, and to their elucidation from the results of my personal experience, I still think that I may to-day speak to you about a disease which we have never had an opportunity of seeing in our wards, but which is certainly well known to you by name. I speak of typhus, which, at least in the totality of its general symptoms, presents so great a resemblance to dothinenteria that the question of the identity of the two diseases, after having been for a long time under discussion, is still far from being settled, although the partisans of non-identity seem now to be the majority.

Epidemic in some countries—notably so in the Britannic Isles—where after having reigned exclusively, first in Ireland, and then in Scotland, it seems now to be permanently installed in some of the manufacturing towns of England, particularly in London, where, in recent years, it has committed great ravages. From the accounts of the disease—described under very various names[1]—furnished by old and modern authors, it appears that epidemics of typhus, originating

[1] Fièvre Pestilentielle, Febris Pestilens: [*Fracastor*, 1546.] Typhus des Camps, Typhus des Prisons: [*Sauvages*, 1759.] Fièvre Pétéchiale, Febris Petechialis: [*Sennertus*, 1641: Selle, 1770, *Borsieri*, 1785]. Typhus Exanthematicus: [*German authors.*] Spotted Fever, Typhus Fever. [*English authors.*]

under the influence of the same causes, and propagated by contagion, have in all periods of history, appeared at various epochs, in the old world and in North America.

France, though not exempt from epidemics of typhus, has suffered less from them than other countries. Without going back to remote periods, it will be sufficient to remind you that during the first fifteen years of the present century, typhus, following the armies which were then overrunning Europe, broke out on several occasions in a considerable number of places in France; and that it has since reappeared, for example, at Toulon in 1820, 1829, 1833, 1845, and 1851[1]: at Rheims in 1839[2]: at Strasbourg in 1854[3]: and that in 1856, imported from the Crimea, where our soldiers imbibed its germ during the war in the East, it declared itself in several other towns, among which were Marseilles, Avignon, and even Paris, where, as you know, in the military hospital of Val-de-Grâce, it prevailed as an epidemic from January to May of this year 1856.[4]

I have said that typhus seems always to arise under the influence of the same causes. This is a point upon which all physicians are agreed. All admit that the morbific matter, the poison, the miasm which engenders the disease, can be spontaneously developed wherever great masses of human beings are accumulated, as in the great centres of population, in armies concentrated within a space too small in relation to the number of persons, in prisons, and in ships. This is particularly the case in ships used as penal hulks, if the men are exposed to bodily fatigue, mental anxiety, moral suffering, and dieted with food bad in quality, and insufficient in quantity. But I also stated, that when typhus is once developed in a locality, it often spreads by contagion, when one cannot point to any other cause for this propagation taking place. Bear also in mind, that in respect of typhus, as in respect of all other contagious diseases, it is not necessary that the contagion be transmitted by persons who

[1] Kéraudren:—Typhus dans les Bagnes de Toulon. [*Arch. Gén. de Médecine, T. III*, 1833.]

Fleury:—Histoire Médicale de la Maladie qui a régné parmi les condamnés du bagne de Toulon, 1829. [*Mém. de l'Acad. de Médecine, T. III*, 1853.]

Barraillier:—Du Typhus Epidémique à Toulon. Paris, 1861.

[2] Landouzy:—*Arch. Gén. de Médecine*, 1842.

[3] Forget:—Preuves Cliniques de la non-identité du Typhus et de la Fièvre Typhoïde. [*Comptes rendus de l'Acad. des Sciences, 9 Octobre*, 1854.

[4] Godelier:—Mémoire sur le Typhus observé au Val-de-Grâce. [*Bulletin de l'Acad. de Médecine*, 1856, *T. XXI*, p. 889.]

have the disease: it may be carried by individuals who have not, and who have never had, the malady, the morbific germ of which they are the means of transmitting.

This fact—an incontestable acquisition of science—suggests the fear that from the constantly increasing intercourse between the two countries, typhus, at present in permanence in England both in the epidemic and sporadic form, will pass over into France, and establish itself among us for a longer or shorter period. It is, therefore, my duty, gentlemen, to give regarding this disease some information, which you may soon, perhaps, have to make use of in practice. This information I will take from a work published by Dr. Murchison, physician to the Fever Hospital of London.[1]

Dr. Murchison discusses the question of the identity or non-identity of typhoid fever and typhus, and declares himself a believer in their non-identity. This is a subject to which I shall have to return. Dr. Murchison states in the preface to his book, that after having been brought up in the opposite belief, he was led by his own observations to adopt the views of Drs. Stewart and Jenner, and that therefore his present opinion cannot be attributed to preconceived ideas.

The invasion of typhus is usually sudden, but it may be preceded by a slight indisposition of one or several days' duration, characterised by general lassitude, vertigo, a little headache, and loss of appetite.

Without premonitory symptoms, the patient is seized with transient irregular rigors, followed by moderate perspiration: he complains of frontal headache, prostration, and a bruised feeling rendering every kind of movement painful, of pains in the loins and limbs (particularly the thighs), and of loss of appetite. During the first two or three days, although the skin is hot, even burning hot, he constantly complains of cold, and places himself close to the fire. The tongue is large, pale, covered with a fur which is at first white, and soon becomes yellow or brown. The taste is vitiated: there is thirst, more or less urgent, which causes the patient to desire every kind of drink, but he soon loathes them all except cold water. Sometimes, there is nausea, and much more rarely, vomiting of bilious matters. The abdomen, generally supple, and sunk rather than distended, is neither

[1] Charles Murchison:—Treatise on the Continued Fevers of Great Britain. London, 1862.

the seat of the slightest pain, nor is even sensitive to pressure. The bowels are generally constipated. The urine is thick and high-coloured. Usually, the pulse is full, but compressible: in some cases, it is hard and bounding, while in others, it is irregular and intermittent. There is a notable variety in its frequency: it sometimes rises to 120, and may afterwards go up to 150, which is one of the most threatening symptoms which can occur; or it may, on the contrary, remain below the normal standard, even falling so low as 28. This is frequently an indication of feeble action of the heart, which in such circumstances contracts twice for each arterial pulsation. Respiration is more or less accelerated: and there is frequently decided oppression of the breathing, accompanied by cough and mucous expectoration, under which circumstances there are heard on auscultation sonorous râles, indicating the existence of bronchial catarrh. The face is red: the margins of the eyelids are swollen, the conjunctivæ injected, and the eyes suffused with tears. At first, the expression of the countenance indicates languor and fatigue, but it soon becomes sad, heavy, and stupid. From the beginning of the attack, there is vertigo, singing in the ears, restlessness, and often complete insomnia, while it also happens that the patient says that he has not slept, although his attendants have seen that he had been asleep for hours. This sleep, however, is disturbed by distressing dreams, and by awakings with a sudden start: after three or four nights, the patient speaks in his sleep or in a semi-delirious state between sleeping and waking. When he awakens, he is conscious of what is passing around him, although his memory and intelligence are a little confused. From an early period, and rapidly, the prostration of the muscular force goes on increasing. He walks with tottering gait: when asked to hold out the hand, it is seen to tremble: this tremulous movement is also observed in the tongue, when an attempt is made to protrude it beyond the mouth. The feeling of debility and exhaustion soon becomes so great that about the third day from the beginning of the disease, the patient is unable to leave his bed.

Between the fourth and seventh day—generally about the fourth or fifth day—the eruption appears on the skin. It consists of numerous irregularly shaped spots, varying in diameter from a mere point to three or four lines. The spots are either isolated, or they are grouped like pieces of marquetry in irregular forms, often recalling the appearance of the eruption of measles. At first, they

are of a dirty rose colour, or they present a sort of bloom, and are slightly elevated above the skin: they disappear when pressed by the finger: from the first or second day, they become of a darker brown shade, no longer disappear, but only become pale, when pressed by the finger. Their margins are ill-defined, and blend insensibly with the general hyperæmie hue of the skin. They usually appear first on the abdomen, then on the chest, back, shoulders, and thighs: in some cases, their first appearance is on the backs of the hands. They are most frequently met with on the trunk and arms, and are rarely seen on the neck or face. They are always most obvious on the dependent parts of the body; and in doubtful cases, it is on the posterior parts and the back that they ought to be looked for. Besides the superficial spots, there are others paler, and less distinct from one another, which, from their being apparently situated under the epidermis, are called sub-epidermic. When these sub-epidermic spots are abundant, they give the skin a wavy marbled aspect, in contrast with the darker and better defined spots formerly described, although sometimes both spots seem to be blended together. There is great variety in the appearance of the eruption of typhus, according to the relative abundance of the wavy or distinct spots. In some cases, there is a profusion of both kinds, and in other cases, there are not many of either. There is also a diversity in the appearance of the eruption, dependent upon the greater or less degree in which it is confluent. The marble-like spots constitute what Jenner has described under the name of the *mulberry rash*, and which other physicians have called *measly* or *rubeolous*. In two or three days the eruption is complete; or, at least, if new spots appear at a later date, they do not attain a full development. The severity and duration of the malady are proportionate to the quantity of the eruption and the darkness of its hue. Such is typhus during its first six or seven days.

Towards the end of the first week, the headache ceases, and delirium supervenes. The delirium varies in its character: occasionally, it is, at first, acute, the patient screaming, talking incoherently, and being more or less violent. He will, unless placed under restraint, get out of bed, walk up and down the room, or even, jump out at the window. This state of violence is generally followed by a period of collapse, during which the patient is calm, and speaks mutteringly in a low voice. As a rule, the delirium is not violent, even at its commencement. Whatever may be its form, it

is accompanied by insomnia, and its manifestations are excited by speaking to the patient. The expression of the countenance becomes more sombre, sadder, and more stupid, the prostration at the same time increasing from hour to hour. The symptoms of nervous excitement are generally most severe in the evening and during the night, while the prostration is greatest in the morning. At this period of the disease, the tongue is tremulous, dry, brown, and rough in the centre: sordes accumulate on the teeth and lips: the bowels remain confined. The pulse ranges between 100 and 120: it is sometimes full and soft, but more frequently is small and feeble. In respect of the respiratory movements, there is also a great variation: the inspirations vary from twenty to thirty in the minute, but they may retain their normal frequency, or they may fall as low as eight, when the pulse is small, and the action of the heart exceedingly disturbed. Again, respiration may be spasmodic or jerking: this is the case when the cerebral symptoms are very severe, as when there is delirium followed by coma. Finally, respiration may also be irregular, the inspirations succeeding one another with extreme rapidity; and also, it may be purely diaphragmatic, the muscles of the chest being seemingly paralysed. This *nervous* respiration does not depend on any affection of the respiratory apparatus, and is an extremely serious symptom. The breath of the patient is fœtid. The skin, colder than during the first week, dry, or slightly glutinous, exhales a peculiar odour, which may be compared to the smell of rotten straw, of deer or of mice, but which is really a smell *sui generis*. The colour of the eruption becomes darker; and towards the middle of the second week, there appear true petechiæ of a purple or bluish tint, which may be developed in the centre of many spots, with the brownish red of which the margins of the petechiæ become gradually blended.

After three or four days, consequently about the tenth or eleventh day from the beginning of the malady, cerebral oppression, or stupor, takes the place of nervous excitement. The stupor at first alternates with the delirium, which is greatest during the night. There is extreme prostration: the patient lies on the back, groaning and muttering incoherently, or he remains quiet and at rest, but showing a tendency to get down to the bottom of the bed. He is quite unable to raise himself up, or even to turn on his side: he is raised with very great difficulty; and is wholly indifferent to surrounding persons and things. At this stage, there are often tremors,

startings of the tendons, and picking of the bedclothes: the look is haggard, and there is an expression of stupidity in the countenance: the conjunctivæ are injected, the eyelids are nearly closed, and the pupils are contracted. Deafness is common. When addressed in a loud voice, the patient looks around him with an astonished gaze, and when told to put out his tongue, he opens his mouth, and keeps it half open till ordered to shut it. These are the only indications of consciousness which he gives, and they, even, are sometimes wanting. His mind, however, is far from being inactive: he dreams the most frightful dreams, which he implicitly accepts as realities, and of which he retains a complete recollection after his recovery. His thoughts turn upon the events of his past life. He fancies that he is persecuted by the persons around him, even by his dearest relations: he compresses years into hours, and in a few hours imagines that he has lived a life-time. Those only who have experienced this mental suffering can form an idea of its intensity. The teeth and lips are covered with sordes: the tongue is hard, dry, brownish black, gathered up into a sort of ball, and is either protruded with difficulty or not at all. The abdomen is flaccid, or sometimes tympanitic. The bowels are confined, or, two or three times a day, stools of rather diarrhœal character are passed involuntarily. There is an increase in the quantity of urine, but it is paler than natural, and below the normal specific gravity: it is passed involuntarily, or there is retention, necessitating the use of the catheter. The skin becomes still colder, and is occasionally somewhat moist. There is an increase in the number of petechial spots. The parts of the body subject to pressure, particularly the sacral region, become red and soft, and are apt to ulcerate. The pulse is rapid, ranging between 120 and 140, small, often of an intermittent character, irregular, and scarcely perceptible: the cardiac impulse, and the sounds of the heart, have either become diminished in intensity, or have ceased to be audible.

The patient may remain in this condition, with life in the balance, for some hours or several days, till at last stupor merges into profound and fatal coma: or, he dies from asphyxia, consecutive upon sudden engorgement of the lungs: or, the pulse becomes imperceptible, the skin being cold, livid, and bathed in profuse sweat, death generally taking place without a return to consciousness, but without stertor occurring, and being apparently the result of syncope rather than of coma.

The issue is not, however, always fatal. Towards the fourteenth day of the disease, a more or less sudden amelioration may occur. The patient falls into a calm sleep, which lasts for several hours, and from which he awakes a new man. At first, he is bewildered, and does not know where he is: by-and-by, he recognises his attendants and friends, and becomes aware of his extreme weakness. His extremities retain their sensibility, but when he attempts to move them, they seem as if they did not belong to his body. The pulse has become stronger and less rapid: the tongue is clean, and at the edges is moist: there is some desire for food. These symptoms of amendment are often accompanied by slight perspiration, diarrhœa, or sediment in the urine. After two or three days, the tongue becomes quite clean, the appetite insatiable, and the pulse normal, or even, it may be, very slow. There is a rapid return of strength. Convalescence, in fact, is complete.

Gentlemen, this picture, drawn by Dr. Murchison, represents to you a case of uncomplicated typhus. The disease, however, presents great varieties in respect of severity, and the relative predominance of adynamic or ataxic symptoms. In cases of average severity, the tongue is never dry nor brown, the pulse is never above 100, and the eruption is never petechial. A slight confusion of memory and the intellectual faculties, with disturbed sleep, seem to be the only cerebral symptoms which show themselves. Local complications, however, may modify the progress and character of the attack.

Of these complications, which vary with the epidemic and the locality, the most common are affections of the respiratory organs. Chest complications generally supervene insidiously, the usual symptoms of cough and expectoration being insignificant or wholly wanting, and the patient making no complaint of pain. Under such circumstances, the rapid breathing, and lividity of the countenance, are the only signs indicative of a pulmonary affection; but rapid breathing is not in itself a conclusive sign, because, as I have already said, it is a frequent accompaniment of fever, and may exist in a very aggravated form irrespective of any important lesion of the respiratory organs. Moreover, if dyspnœa dependent on an important lesion declares itself by lividity of the face and hands, that lividity does not appear till the complication on which it depends is far advanced, and often not till it is irremediable. When, therefore, there is the least doubt as to the nature of the

affection, the chest ought to be examined by auscultation and percussion.

Bronchitis is perhaps the most common of all the complications of typhus. In some epidemics, it is met with in the majority of cases. In Ireland, bronchitis is so usual a complication, that the typhus of that country has been called *catarrhal typhus;* and German physicians, including Rokitansky, who have derived their knowledge of typhus from descriptions of it as seen in Ireland, believe that it is nothing more than a thoracic form of dothinenteria. Bronchitis may be the first symptom of typhus, or it may come on during the course of the disease, and continue during its decline. It is necessary to watch carefully all cases in which there are bronchitic symptoms. There is no immediate danger, when the only signs of pulmonary affection are an occasional cough and some scattered sibilant râles: but when the prostration increases, the thoracic inflammation is liable to extend suddenly, and at the same time insidiously, and to become more or less associated with hypostatic engorgement. Under these circumstances, coughing and expectoration being impossible in consequence of paralysis of the bronchial muscles, the catarrhal secretion accumulates in the bronchial tubes, and induces asphyxia.

I have thought it best to give you a nearly exact translation of Dr. Murchison's description of this complication, on account of the frequency of its occurrence; but it will suffice merely to enumerate the others.

Hypostatic engorgement of the lungs is described as a complication of typhus. Coming on generally at a more or less advanced period, about the eleventh or fourteenth day, sometimes earlier—as early sometimes as the seventh day—and being usually associated with bronchial catarrh, it is the most common cause of death in English typhus. Hypostatic engorgement must not be confounded with that acute pneumonia, in which there is exudation of plastic lymph into the pulmonary cells and intervening cellular tissue—a form of pneumonia which is very rare. Hypostatic engorgement sometimes terminates in pulmonary gangrene, particularly in persons, who, prior to their attack, have been ill-fed. *Pleurisy* is another but a rare complication of typhus. When it does occur, it is latent.

Phlegmasia alba dolens often supervenes in the decline of typhus, but less frequently than in the decline of typhoid fever. *Purulent infection* with articular abscesses is rarer still. When it does occur,

it proves rapidly mortal. *Scorbutus* is a complication met with in some epidemics. The symptoms by which it shows itself are a great tendency to syncope, spots of purpura, and hæmorrhages by the nose, bronchial tubes, stomach, intestines, and bladder.

Imbecility, and sometimes *mania* (as in typhoid fever), occur as sequels to, but not as complications of, typhus. The same remark applies to paralysis, which may be general, or partial. There may be hemiplegia, paraplegia, or paralysis of the bladder, or paralysis affecting the instruments of motion or sensation, or both at once. The paralysis may also affect the organs of the senses—of hearing, for example, leading to deafness which frequently comes on in the course of typhus, continues after convalescence, and is often associated with otorrhœa and inflammation of the external ear;—and of sight, occasioning a certain degree of amaurosis. These paralytic affections of typhus are generally transitory, but sometimes they continue for life.

Erysipelas of the face, erysipelas of the hairy scalp; *œdema* of the inferior extremities, in some cases *anasarca*, at times dependent on renal disease; *gangrenous affections* of parts subjected to constant pressure, and gangrene of the limbs similar to that which we have seen in dothinenteria; *coma; eruptions* of furuncular or pemphigoid character; *inflammations of the cellular tissue; parotitis; buboes;*—such are the principal complications which have been described as rendering unfavourable the prognosis of typhus.

The *inflammatory form* of typhus is characterised by the intensity of the febrile action, and acute delirium. It is most commonly met with in the young and vigorous, and chiefly among those in comfortable circumstances. The *ataxic form* is characterised by the predominance of nervous symptoms, such as delirium, somnolence, and *subsultus tendinum*. The fever is said to be *adynamic*, when there is great prostration, involuntary evacuations, a tendency to syncope, coldness of skin, and a slow pulse. It is said to be *ataxo-adynamic* or congestive, when the symptoms are those of congestion.

Typhus has been called *sidérant* [*i. e.* influenced by the stars], when it proves fatal within a few hours or days. It is said to be *mild*, when, as generally happens in sporadic cases, it runs through its stages without showing any serious symptoms. The disease is sometimes so mild, that, were it not for the presence of the characteristic eruption one might suppose that the affection was a simple synocha.

Under the name of *typhisation à petites doses*, Dr. Félix Jaequot, a Freneh physician often quoted by Dr. Murehison, has deseribed an aggregate of symptoms met with in persons eonstantly exposed to the contagion of typhus, and who are not otherwise affeeted by the poison. These symptoms are general diseomfort, slight fever, loss of appetite, sleeplessness, oeeasional eonfusion of ideas, and a feeling of general fatigue. Real typhus sometimes deelares itself in this way under the eireumstances referred to; but in general, only the symptoms now enumerated oeeur, and they disappear on the patient leaving the poisoned atmosphere.

The diagnosis of typhus presents no diffieulty, when the eharaeteristic eutaneous eruption exists. When this is absent, typhus may be confounded with dothinenteria and other diseases eharaeterised at some periods of their course by typhie symptoms. However, independently even of this specifie eruption, typhus ean be distinguished from typhoid fever by an aggregate of symptoms which I shall have to bring under your notiee when I discuss the question of the identity or non-identity of the two pyrexiæ. As to the diseases in which the oeeurrenee of typhoid symptoms may lead to diffieulty of diagnosis, an attentive observation of the phenomena will prevent mistakes.

Hitherto, gentlemen, I have said nothing regarding the researches whieh have been made into the temperature of typhus. I reserved my remarks on that point, that I might make them in eonneetion with the subject of diagnosis. Thermometrical investigation furnished valuable indications whieh enabled me to form a definite opinion in respeet of a ease whieh you had an opportunity of observing in our wards, and the partieulars of whieh I am now going to lay before you, from notes taken down by one of my worthy pupils, Dr. Alfred Duclos of St. Quentin.[1]

On Saturday 11th June, there eame into my wards a man, aged 27, of good eonstitution, who had lived in Paris for three years and had from January last been treated for pulmonary inflammation. On the Thursday, the patient had been suddenly seized with very intense headaehe, rachialgia, feebleness of the legs, particularly of the right leg, in whieh, from that date, he eomplained of laneinating pains. Respiration was difficult and sighing, but he had neither

[1] Duclos:—Quelques Recherches sur l'état de la Température dans les Maladies. *Thèse Inaugurale.* Paris, 1864.

cough nor hæmoptysis. On the Wednesday, there was neither vomiting, diarrhœa, nor epistaxis. On the day of his admission into hospital—the fourth day of the fever—we found a considerable number of papular spots. Next day—June 12th—the eruption was confluent on the trunk and fore-arms, sibilant râles were heard in the chest, and there was stupor. There was no diarrhœa.

On the 13th June, the sixth day of the fever—there were vomiting, epistaxis, and fine sub-crepitant râles at the base of both lungs. Dry cupping was ordered, but by mistake the cupper scarified. On the 14th, there were stupor, delirium, sub-crepitant râles, and gurgling in the right iliac fossa. The eruption was very confluent, and so great was the confluence that on the fore-arms, the eruption was so like that of measles, as to lead me to think that the case might be one of anomalous measles notwithstanding the symptoms of dothinenteria which existed. On the 15th, the eruption was gone, but the general condition of the patient, including the delirium and stupor, remained as before. On the 16th, the patient passed his urine involuntarily: he had no diarrhœa: but he had hemiplegia, an unusual occurrence in dothinenteria—there was a very decided want of power in the right arm and leg, as well as distortion of the features. He was cupped at the nape of the neck; and a draught was administered containing twenty-five centigrammes of musk. The delirium and stupor disappeared: the patient answered with precision the questions which were addressed to him, and from that day took his full share in conversation. Two days later, he was able to leave his bed, but there was still a manifest remaining feebleness of the right side. He remained permanently hemiplegic, an occurrence which sometimes follows typhus, but is never a sequel of dothinenteria.

In this case, in which I long hesitated in my diagnosis, examination of the thermal index enabled me to affirm that the disease was typhus. This is what I observed :—on the fifth day of the disease, the thermometer in the evening indicated 40°.4: next day—the sixth day of the malady—there was a slight remission in the fever, and the thermometer fell to 39°.8, to rise again in the evening to the same point whence it had fallen in the morning. On the seventh day, there was a somewhat remarkable fall in the evening temperature: it had fallen to 40°, a circumstance attributable to the abstraction of blood by cupping. On the eighth day, the evening temperature was 40°.6: it fell again on the morning of the

ninth day to 39°.6, rose in the evening to 40°.4; fell one degree on the morning of the tenth day, and in place of rising six or eight tenths of a degree in the evening, as it had usually done, it only rose four tenths, or in other words, it was 39°.8 on the evening of the tenth day. This remission was like the former due to cupping. On the eleventh, twelfth, and thirteenth days, there was observed the same regularity in the evening ascent and morning descent of the pulse which had at first been observed; but on the morning of the fourteenth day, the temperature fell abruptly to 37°.2. That is to say, between the evening of the thirteenth, and the morning of the fourteenth day, within the space of a few hours, there was a fall in the temperature of the patient of two degrees and four tenths. The temperature, therefore, suddenly became normal and convalescence began exactly at the end of the second week. An abrupt defervescence of this kind never occurs in dothinenteria, nor does defervescence ever take place in that fever at the end of the second week. It consequently follows, that our case was not one of dothinenteria.

But the eruption which reminded one of measles, or rather, I should say, of the measly rash of dothinenteria, might be attributed to typhus fever. Certainly the thermal changes in our patient were exactly those which occur in that disease. Here is what takes place in respect of temperature in typhus patients. The temperature continues to rise before the exanthematous spots come out, and for five or six days, or it may even be for ten days after it appears; this is a characteristic which at once distinguishes typhus from the eruptive fevers. Again, in typhoid fever, defervescence takes place by a regularly decreasing temperature, whereas in typhus, the decline of temperature is rapid, continuous, and without evening exacerbation. By means, then, of observing the temperature in the case which I have been referring to, we were enabled at the beginning of the attack to avoid mistaking the disease for measles, and at the close for dothinenteria.

My object in now describing this case is to demonstrate to you the clinical value of the thermometer. In conclusion let me add, that the thermal diagram is so characteristic, that Dr. Hübler, clinical assistant of Dr. Walther of Dresden, whenever he sees it, at once makes a diagnosis, even in circumstances which in this case caused me to hesitate for several days.

Generally speaking, typhus is a very serious disease. According

to Dr. Murchison's statistics, the average mortality in the Irish and Scottish epidemics, has been as high as one-fifth of those seized. In London, between 1856 and 1860, a period, however, during which the cases were not numerous, the mortality reached the enormous proportion of forty-two in the hundred. In general, the mortality is greatest at the beginning and at the height, and lowest during the decline, of an epidemic.

There are a certain number of other circumstances which affect the prognosis. Thus, for example, the disease is more severe in men than in women, a fact which Dr. Murchison explains by stating that typhus principally attacks men debilitated by the privations incident to extreme poverty, or by intemperance. This fever is also more dangerous in adults and old people than in young subjects. It is a more serious disease among the poor than the rich. In a word, typhus is most serious when it attacks persons of enfeebled constitution. The state of the mind of the patient has an important influence on the disease. Dread of some misfortune, the fear of death, or any mental anxiety increases the danger. A pulse above 120, *nervous* respiration, and the early occurrence of cerebral symptoms, are prognostics of the worst augury. All other conditions being equal, it may be said, the more profuse the exanthematous eruption and the darker its colour, the greater is the danger. Even in the worst cases, however, the physician must not despair; for in no disease so often as in typhus is recovery seen to take place after the position of the patient has become apparently desperate. Recovery is sometimes abrupt: and as a general rule, convalescence is very rapid in typhus, a circumstance which constitutes a differential character between it and typhoid fever.

We have now come to the question of the identity or non-identity of typhus and typhoid fever. It is a question which has been long under discussion, and is still debated. Not having had sufficient opportunities of studying typhus at the bedside of the patient, I ought, perhaps, on the plea of incompetence, to decline giving an opinion. I may, nevertheless, say that from the perusal of the works of those who have treated this subject, I have formed an opinion in unison with that of those French, English, and American physicians who maintain that the two diseases are not identical.

Those who hold with Stokes, Magnus Huss,[1] and Lind-

[1] Magnus Huss: Statistique et Traitement du Typhus et de la Fièvre Typhoïde—Observations Recueillies à l'hôpital Séraphin de Stockholm. Paris, 1855.

wurn[1] that typhus fever and typhoid fever are only different forms of one and the same pyrexia, and not two distinct nosological species, still recognise the existence of two absolutely distinct types, the one corresponding to our dothinenteria—the "*typhus abdominalis*" of the Germans, the "abdominal," "ileo-typhus," and "enteritic fever" of the English—: and the other being "petechial fever," the "typhus petechialis," the "typhus exanthematicus," or "typhus fever" characterised by a specific exanthematous eruption, very different from the rosy lenticular spots of typhoid fever, and which after a series of changes becomes petechial—the mulberry rash: this form of fever is characterised still more by the absence of the intestinal lesion peculiar to dothinenteria.

Although these two forms of typhus can, in well-marked cases, be perfectly distinguished from one another, there are, according to the physicians who believe in the identity of the two fevers, intermediate cases coming more or less near the primitive types, but blending and combining in such a way as to make it impossible to perceive sharply-marked distinctive characters. These mixed forms are looked upon, by the supporters of the doctrine of identity, as the links of a chain, the two extremities of which are the two typical forms.

Two principal considerations upon which is based the doctrine of the identity of typhus and typhoid fever are, that both seem to be produced by the same causes, and that during the prevalence of the same epidemic constitution, the two extreme forms may prevail simultaneously or predominate alternately; but the doctrine chiefly rests upon the capital allegations that the contagion of typhus is capable of producing typhoid fever, and that also from the contagion of typhoid fever, typhus may originate.

According to those by whom the doctrine of identity is maintained, the explanation of the transformations which seem to negative their views, is to be found partly in the climatological differences of countries, and partly in the hygienic conditions and diverse modes of living of different peoples.

The advocates of the non-identity doctrine say, that apart from the absence of specific anatomical lesions, typhus generally presents symptoms sufficiently characteristic to distinguish it from typhoid fever. Thus, in typhus, the invasion is sudden: most of the symptoms, such as fever, stupor, and delirium appear rapidly, and with

[1] LINDWURN: Du Typhus en Irlande. 1852.

great intensity. The abdominal symptoms, such as diarrhœa, gurgling in the iliac fossa, and meteorism are generally, nay, are almost always, absent; and when they do supervene, it is only towards the close of the attack. The total duration of typhus, as I have said on the authority of Dr. Murchison, and as you have had an opportunity of seeing in the case of our patient in the clinical wards, is less than that of typhoid fever, being fourteen days in cases free from complication. Its favourable termination takes place more abruptly, and convalescence proceeds more quickly, than in typhoid fever.

In reply to the capital argument of their opponents, the physicians on whose side I range myself deny that the contagium of typhus can engender typhoid fever. They maintain that the having had one of these fevers does not prevent a person from taking the other, but that persons who have had either typhus or typhoid fever are found generally to have acquired immunity respectively from a second attack.

The remarks which I made upon the treatment of typhoid fever are also applicable to the treatment of typhus. We cannot cure the disease: we cannot even shorten its course: all that we can do is to be on the watch to assist nature. I repeat to you in the words of Stokes of Dublin, that *the disease cures itself*. If you keep up the patient to the fourteenth, nineteenth, or twenty-first day, he will recover. The leading indication always is to sustain the vital powers by food suited to the digestive capacity of the individual, by stimulating and tonic beverages, and by wine and spirits measured out in exact quantities.

LECTURE XVII.

MEMBRANOUS SORE THROAT, AND IN PARTICULAR HERPES OF THE PHARYNX. [*Common Membranous Sore Throat.*]

Many different kinds of Membranous Sore Throat might be enumerated.—Common Membranous Sore Throat often Originates in Herpes of the Pharynx.—Often Difficult, especially during an Epidemic, to form a good Differential Diagnosis between it and Diphtheritic Sore Throat.—In these Doubtful Cases we must act as if the malady were of a bad character.—Recovery from Common Membranous Sore Throat is Spontaneous.

Gentlemen:—It is only by recognising the existence of morbific causes, as I shall more fully show when I come to discuss the subject of specificity, that we become justified in constituting species in pathology. We could not establish species upon an acquaintance with symptoms, they being essentially changeable and fleeting, as well as common to numerous maladies; nor could we base it upon lesions, although they certainly present more stable and less equivocal grounds of distinctiveness. Sometimes, indeed, a lesion seems to characterise, I had almost said to constitute, a disease: but often we cannot name any lesion as the essential characteristic of a malady. There may, on the one hand, be a complete absence of characteristic lesion, as when scarlatina, measles, and small-pox occur without eruption; so, on the other hand, we may meet in the same disease with many lesions of different kinds, as, for example, in syphilis; or again, similar organic alterations may occur in the course of diseases which are essentially different from one another. This is what takes place in membranous sore throat.

Under the exceedingly vague name of membranous sore throats [*angines couenneuses*] are included a number of affections possessing as a character in common plastic exudation into the pharynx. The exudation, whatever may be its cause, consists of fibrine nearly pure. In it, with the assistance of the microscope, we find small molecular

corpuscles, detritus of epithelial cells, some globules of pus, and some globules of blood. These bodies vary, no doubt, in form, appearance, and consistence, but it is useless to attempt to distinguish different species of sore throat by an appeal to these variations.

At the same time, if we only take into account the character which these affections possess in common, we shall confound with one another maladies which are quite different in their nature. We shall, for instance, confound inflammatory sore throat, with erysipelas of the pharynx, and affections, generally speaking, not all serious, in which whitish pseudo-membranous concretions appear sometimes on the tonsils and veil of the palate, with other kinds of sore throat which are often frightfully dangerous, and for which the name of *diptheritic* sore throat has been more specially reserved. I propose to speak of the latter in future lectures.

Membranous sore throat, then, constitutes a nosological genus which includes many species. It is evident that it would be easy to multiply examples, when we consider that mucous surfaces are not only seldom excoriated without the excoriations becoming covered with fibrinous exudations, and still more when we consider that when the inflammation of these surfaces is somewhat active, there is a remarkable tendency to the formation of plastic deposits. Thus, cauterization of the pharynx with nitrate of silver, ammonia, or hydrochloric acid immediately excites inflammations, which are followed by the formation of pseudo-membranous deposits. These transient affections may lead to a mistaken belief in the existence of diphtheritic sore throat.

The effects produced by the application of cantharides to mucous membranes is still more remarkable, and deserves more special consideration than it receives, because cantharidic pellicular inflammation is in appearance similar to diphtheria: there are, however, well-marked characters by which the one affection can be distinguished from the other. As Bretonneau has said in his account of his experiments on animals, the cantharidic inflammation, limited to the surface to which the vesicant has been applied, soon becomes circumscribed and disappears, but the diphtheritic inflammation extends and persists.

Along with affections, which, when they occupy the pharynx constitute forms of membranous sore throat, I place *mercurial*, too often confounded with *syphilitic* membranous sore throat.

In describing scarlatina, I mentioned scarlatino-membranous sore

throat, and pointed out the differences between it and diphtheritic sore throat. I said then that the scarlatinous deposit has a pultaceous aspect, is less adherent to the tonsil which it covers, and bears less resemblance to the false membrane of diphtheria, than to the secretion from the surface of ill-conditioned ulcers. I believe that I dwelt sufficiently on the subject to obviate the necessity of now returning to it.[1]

But when speaking of the complications of dothinenteria, I omitted to speak of the *pultaceous sore throat* which sometimes supervenes in that disease. I do not refer to thrush [*muguet*] which as you know, and as I shall have occasion to repeat to you, appears rather frequently as an epiphenomenon in the course of, and particularly at the end of, severe fevers, as well as in the wane of phthisis and other chronic diseases: I refer to pultaceous sore throat [*angine pultacée*], a complication which is not very serious, but is sometimes mistaken for diphtheritic sore throat.

Common membranous sore throat [*angine couenneuse, dite commune*] is of all the membranous affections of the throat that which has given and does give rise most frequently to errors in diagnosis. Bretonneau did not fail to perceive the nature of this affection. It is true that in his treatise on diphtheria he was not very explicit on the point, and was satisfied to mention the coincidence of common membranous sore throat with herpes, which, he says, "appears around the mouth and nasal orifices, while at the same time a membranous exudation occupies the surface of one of the tonsils." But my illustrious master often enunciated to his pupils that this common membranous sore throat was simply herpes of the pharynx: he compared what takes place in the mucous membrane of the mouth and pharynx with what occurs in the conjunctiva when it is the seat of herpetic eruption. This is an idea which I have often expatiated upon in my clinical lectures, both in the Necker Hospital and in this theatre: but it is to Dr. Gubler, formerly my pupil, now my colleague at the Beaujon Hospital, that the merit is due of having specially called general attention to this important subject, by the publication of his excellent memoir on herpes of the throat [*herpès guttural*].[2] Now that the affection has been sufficiently made

[1] See p. 179.

[2] *Bulletins de la Société de Médecine des Hôpitaux;* and *Union Médicale*, 1858.

known, there are few physicians who have not had opportunities of observing cases of it.

A person when in enjoyment of perfect health, after a chill or some other cause, is seized with general discomfort, lassitude, and pains in the limbs, symptoms which are soon accompanied by febrile reaction. These symptoms are of variable intensity, and are sometimes combined with disorders of the digestive canal, such as want of appetite, nausea and vomiting. The general discomfort continues for about twenty-four or thirty hours, when all at once the patient complains of sore throat. The pain, generally limited to one side of the pharnyx, sometimes (though rarely) occupying both sides, extends to that part of the cervical region which corresponds with the angle of the maxilla. There is difficulty in swallowing, a feeling of acridity and burning heat in the throat, which extends sometimes to the larynx, but oftener to the nasal fossæ, and still more frequently to the Eustachian tube. The submaxillary glands are swollen, but not severely; and the amount of glandular swelling is far short of what is seen in diphtheritic sore throat, in which it is sometimes extensive. In common membranous sore throat enlargement of the glands cannot be recognised without having recourse to palpation. Care must be taken not to mistake for engorged glands the tumefied tonsils which we may come upon with our exploring fingers.

If the practitioner is not called in till some time after the beginning of the affection, he will find, on examining the throat, one or sometimes both tonsils red, swollen, and covered with membranous exudation of a yellowish white colour, and slightly adherent to the subjacent tissues.

Let me suppose, Gentlemen (and the circumstances will often occur to you in practice), that you encounter this affection in a form presenting none of the lesions I am about to mention, and the presence of which would exceedingly facilitate the diagnosis—in the absence of these pathological lesions, and of precise information regarding the previous course of the disease, your first idea would be that the case was one of diphtheria. This is particularly likely to occur with children who cannot give an account of what they feel, and in whom the examination of the throat is rendered difficult by the resistance offered; in such circumstances your embarrassment will be great. The embarrassment is still greater both in adults and in children, when, as often occurs, the characters which distinguish

diphtheritic from herpetic membranous sore throat are not unmistakably clear. As Bretonneau has justly remarked, the question can sometimes only be solved by the dangerous tendency of the diphtheritic affection to extend to the tonsils, pharynx, and respiratory passages. During an epidemic, when the diagnosis is undecided, we ought in every case to be as prompt to act as if we had real diphtheria to combat; for it is better to treat energetically a malady which is not serious, than to run the risk of allowing one of an essentially malignant character to gain ground.

When you have obtained a history of the case from its commencement, when you have learned that an acute, burning pain in the throat was preceded some days by general symptoms of illness, by febrile discomfort, and disorder of the stomach, you may conclude that the case is one of common membranous sore throat; for as a general rule, diphtheria does not announce itself in that way. It, in general, begins insidiously. Hardly has the patient become a little feverish, when he complains of sore throat. Nevertheless, I hold that we cannot rest a solid diagnosis upon distinctions so devoid of precision.

How are the membranous deposits formed? When we are enabled to follow step by step, so to speak, the development of the pharyngeal affection, we see on the tonsils, after some time—after a few hours or two or three days from the appearance of the first general symptoms of illness,—a more or less confluent eruption of red spots, which soon become excoriated. These superficial ulcerations are covered almost immediately with a greyish white plastic exudation, which, spreading beyond the limits of the ulceration, may become united to ulcerations originating in other herpetic vesicles, so as to form more or less extensive membranous patches. But if, as Dr. Gubler has satisfactorily proved, this extension of the membranous deposit partly explains the formation of large membranous patches on the pharynx, it does not completely explain it: there is another cause likewise in operation. The local inflammation which has preceded, which accompanies, and which follows the development of the herpetic vesicle, does not remain confined exactly to the original space: it extends to the surrounding parts, where it manifests itself by redness, swelling, and œdematous induration: this inflammation, though not ulcerous, does not the less give rise to an exudation of plastic products similar to those secreted by the ulcerated surface. On raising this deposit, which is easily

detached by using a pledget of charpie, there is found below it an ulceration more or less extensive: perhaps there may be only a small ulcerous point remaining, or the mucous membrane may be entirely cicatrised, and present no trace of the primitive lesion.

When the herpetic vesicles are more apart from one another, it is easier to perceive the nature of the affection. We then see white patches, surrounded by a pretty extensive inflammatory areola, and varying from the size of a millet seed to that of a pea. These spots leave in their place superficial ulcerations, which may have raised edges, the result of œdematous swelling of the neighbouring inflamed tissues. When ulcerations of the same nature are situated in the skin, they soon become covered with a brownish crust; but nothing of this kind occurs when their seat is on the mucous membranes. The plastic exudation from the denuded surface of the dermis may be, as I have already said, in sufficient quantity to cover the ulceration and spread beyond it; or it may be so scanty as to be removed by the movements of deglutition as soon as it is exuded, in which case the ulcerations are very soon cicatrised, so that in point of fact no membranous deposit is formed. This is the *aphthous* sore throat of the English physicians, and is the only affection of this class which they describe. M. Féron has considered it as a special form of the disease.[1] The older authors knew it: and it was probably this affection which Aretæus called benign, common ulcers of the tonsils—*ulcera mitia, familiaria.*

But I do not wish to leave a false impression on your minds. The excoriations which proceed from pharyngeal herpes are very different from true aphthæ of the pharynx, both in respect of their cause and manner of evolution. The aphthous affection in the mouth, or in the throat, is a rather deep ulceration, analogous to the pustule of ecthyma in the skin. It occupies an isolated situation, is exceedingly painful, lasts a long time, is easily reproduced, and is almost always associated with a general chronic state. In a large proportion of cases, the herpetic eruption shows itself simultaneously on other parts of the cavity of the mouth, on the sides and tip of the tongue, on the internal surface of the cheeks and lips, and on the roof of the palate. There is no possible room for doubt in

[1] Féron (de Lille): De l'Angine Herpétique. [Thèse Inaugurale.] Paris, 1858.

diagnosis, when, as is usually the case, the herpes is seen on the lips: we can then verify the similarity of the affection seen at the orifice of the mouth, by comparing it with that which occupies the pharynx, and there constitutes membranous sore throat.

A case in point came under your notice: the patient was an unmarried woman, 28 years of age, who lay in bed No. 4 of our St. Bernard ward. She had been suffering for a month from catarrh, when one morning she washed her room: she in consequence took cold, and felt very much knocked up. Next day, however, she went to her work, and continued at it during the whole day, although she felt very uncomfortable. In the evening, she had rigors and fever. On the following day, she again went to the shop where she worked: and she recollects distinctly that she had on that day a fever-spot [*bouton de fièvre*] on her lip. On the fourth day from that on which she washed her room, her general discomfort was so great that she had to remain in bed: she experienced a sensation of burning pain in the face. On the fifth day, she had violent sore throat, with a general feeling of prostration, lassitude, and pains, loss of appetite, and difficulty of breathing. Under these circumstances, she made application for admission to an hospital, at the central office: when at that office, she became sick and had copious vomiting of bilious matters.

She was sent to our wards in the Hôtel-Dieu. We were particularly struck with the anxiety and dyspnœa depicted on her countenance. Her voice, however, was quite natural. No morbid condition of the respiratory organs was revealed by auscultation or percussion. The sore throat was severe, deglutition was difficult, and there existed an incessant fatiguing cough. On examining the pharynx, we saw the red and swollen tonsils: the uvula also was inflamed, and glued as it were to the left pillar of the veil of the palate. The entire mucous membrane of these parts was covered with whitish spots having the appearance of false membrane. There was high fever and hot skin: the pulse was 125. The patient also had gastro-intestinal symptoms, such as anorexia, ardent thirst, a bitter taste in the mouth, and constipation. The state of the patient continued very similar next day, but there was less dyspnœa and fewer membranous patches. The treatment was limited to the use of mulberry syrup gargles, and taking barley water. She was put on low diet, and only got soups. On the eighth day from the beginning of the attack, the fever had subsided, the respiration was freer, and the local

affection had to a great extent disappeared. There were only some whitish points on the right tonsil, the swelling of which, as well as of the other parts, was greatly diminished. Two days later, the patient left the hospital, being quite recovered. The duration of her malady was ten days.

We had a young man in our wards, in whom the symptoms of the disease were even more precisely characterised. In addition to the herpes on the pharynx, there was a profuse eruption of herpetic vesicles on the cheek; and, making allowance for the diversity of aspect imparted by diversity of situation, it was impossible not to see the essential identity of the affection.

Some of you, I presume, recollect this young man. He was an English domestic servant, aged 16. He came into hospital at the end of February 1868 and in five days left quite recovered. His bed was No. 1 of St. Agnes's ward. He had just come from a long journey, during which, having been exposed to abrupt variations of temperature, he took cold. On reaching Paris on the 19th February, he only experienced great fatigue, but next morning, he had a feeling of general discomfort. During the day, he had slight vomiting and rigors: he complained of pains in the head: and went to bed, where he perspired profusely. On the 21st, all of these symptoms had increased: there was ardent fever: and so great was the patient's debility that he was obliged to keep his bed. He had a great deal of headache, and he began to feel pain in the throat. At the same time, there appeared on the lip a pimple, which he called a *bouton de fièvre*. The sore throat became rapidly worse: he had passed a bad night, and there was coryza with lachrymation. By the 23rd, the pharyngeal symptoms had abated, but there was profuse salivation. A physician, who was called in, sent him to the Hôtel-Dieu, after touching his throat with a solution, regarding the composition of which the patient was not able to inform us.

On his admission to our wards, I observed on his face an eruption, which had come out since the morning. Several groups of vesicles, mostly of the size of a pin's head, but some a little larger, were to be seen on the right cheek, resting on a bright red base, in a line between the temple and the mouth. Some of these vesicles, presenting all the characters of herpes, were situated on the ala of the nose and on the right labial commissure: there were likewise others on the left commissure and on the chin. The herpes on the lips, however, being more advanced than that in other localities, was

beginning to dry up. The patient complained of violent pain and annoying heat in the face.

On examining the cavity of the mouth, we detected general redness of the mucous membrane, particularly at the right side, where herpetic vesicles were disseminated: on the tongue, also, there were some of the vesicles. In no situation were the redness and eruption more decided than on the isthmus of the fauces. The tonsils, red and swollen, also, the uvula and veil of the palate, likewise red, were covered with vesicles, some of which were white, semi-transparent, and acuminated, others were ulcerated, and others again were *covered with a fibrinous exudation*, forming a layer with jagged edges extending beyond the ulcerated surface. Before us, then, we had the herpetic vesicle in its different phases of evolution. The lower part of the pharynx participated in the general redness, but exhibited none of the characteristic eruption. The patient suffered from pain in the throat, and an uneasy feeling which excited constant cough: the cough was guttural and painful. There was scarcely any fever, and next day, it had completely subsided. I prescribed only emollient gargles. On February 28th, the young man left the hospital having quite recovered. He had no sore throat; and nothing remained on the face to indicate where the herpes had been, except a few red marks.

I must not omit to mention some other forms of herpes affecting mucous membranes, to which Bretonneau was in the habit of calling the attention of his pupils, and which I have many times pointed out to you. I refer to herpes of the conjunctiva, and herpes of the vulva.

It often happens, that when the herpes has the degree of confluence which it had in the young Englishman whose case I have just related, there is a group of vesicles on one of the eyelids: in such a case, one or two vesicles may form on the conjunctiva, or even on the cornea. When situated on the cornea, they produce an exceedingly painful keratitis, sometimes accompanied by photophobia, but which yields very easily to treatment. This form of ophthalmia is in general very imperfectly understood.

Every one is aware that herpes of the prepuce is very common, and that it is often coincident with guttural and labial herpes; but from the reluctance of women to make known such complaints, it is a less familiar fact that herpes affects the inner surface of the *labia majora* in the same circumstances, and perhaps as often, as it attacks

the prepuce in males. Dr. Bernutz, when physician to the Venereal Hospital for Women, more than once discovered herpes of the neck of the uterus, which, like guttural herpes, is often associated with fever, acute pain in the lower part of the abdomen, and leucorrhœa. This is the explanation of those attacks of transient metritis which we see coincident with common membranous sore throat, and which sometimes so greatly alarm women.

I now return, Gentlemen, to the consideration of the differential diagnosis of common membranous sore throat and diphtheria.

There is no difficulty in the diagnosis, when the herpetic eruption of the pharynx is non-confluent; and the diagnosis is still more easy, when the eruption is seen on other parts of the mucous membrane of the mouth and on the lips, as it then presents itself in its own unmistakable characters. When the eruption is confluent, and when there is a pseudo-membranous exudation on the tonsils and veil of the palate, the coexistence of herpes of the lips or face will signally enlighten the physician as to the nature of the membranous sore throat he is called upon to treat, and will at the same time enable him to distinguish it from diphtheria. But when, as often occurs in practice, the membranous affection of the throat, under which the special characters of herpes have disappeared, when this membranous affection exists alone, hesitation is allowable. Although the ulcero-membranous lesion often assumes the particular appearance which I have just described, it is necessary for diagnostic usefulness that this appearance be quite distinctively marked, and that an opportunity has been afforded of exactly ascertaining the characters of the affection; this is especially difficult in children, who submit badly to the necessary examination. It is quite true, that during the progress of the local disease, we still find, at least in some cases, numerous features of its primitive appearance; but nevertheless, at the very time when it is of importance to form an opinion, error is often unavoidable. Without being afraid of too much insisting on the point, I again repeat, that in cases in which you cannot form a decisive diagnosis between common membranous sore throat and diphtheritic sore throat, you ought to lose no time in adopting active measures, and proceed just as if you had to do with an undoubted case of malignant sore throat. Do this all the more fearlessly that (as Bretonneau justly remarks) the topical applications suited to stop diphtheritic inflammation, so far from

aggravating the common membranous sore throat, shortens its duration.

On the other hand, Gentlemen, you must not hastily come to the conclusion that you have a case of diphtheria, when the malady may be the milder affection: such a mistake may afterwards prove unfortunate. Grant that you have cured a certain number of your supposed cases of diphtheritic sore throat by emetics, mercurial preparations, or other remedies. Encouraged by apparent success, you will employ the same treatment when you encounter a real case of diphtheria; but then, the remedies which had seemed so efficacious will fail, and be the cause of your losing precious time which ought to have been used in contending with a disease demanding prompt and energetic measures.

When, in the course of these clinical lectures, I shall have to speak to you of thrush [*muguet*], I will state the characters by which diphtheria and the common membranous sore throat can be distinguished from some affections with which they still are often confounded.

When you have diagnosed with certainty herpes of the pharynx, your anxiety regarding the issue of the case is at an end. It will get well spontaneously. The only treatment required will consist of borax or alum mouth-washes, and astringent gargles.

Bear in mind, however, Gentlemen, that I shall have to return to this point, and to adduce cases to show that a common membranous, may become the starting point of a malignant sore throat.

Remarkable examples of the transformations to which I allude are given in the reports of epidemics of sore throat which prevailed in France during 1858. Permit me, Gentlemen, to repeat to you what I said in the account which I was appointed by the commission on epidemics to read, in their name, to the Academy of Medicine at its sitting on the 22nd November, 1859.[1]

The characteristic feature of the epidemics of the year 1859 was the concomitance of common membranous and diphtheritic sore throats. Previous to the appearance of the diphtheritic affection, there was observed in many districts a marked predisposition to simple sore throat: the cases of mild sore throat, however, though only simple herpes of the pharynx, did not always present the regular symptoms usually met with in that affection. Some cases were unusually pro-

[1] Mémoires de l'Académie Impériale de Médecine, t. xxiv, p. 31.

tracted in their course. In others, the membranous affection degenerated; and the physician had to ask himself whether he could maintain a favourable prognosis. This state of the medical constitution was no doubt preparatory to the advent of serious, in succession to the simple prevalent, sore throats. Not only was the one affection seen to succeed the other, but in partial epidemics, both pathological forms were observed to be more or less closely associated.

Cases collected by eminent physicians, and in different parts of the Empire, leave no room for doubt on this point. The similarity, or rather, I may say, the identity of what was seen at the same time in different localities was most remarkable: and the only difference observed was that the relation between the benignant and malignant sore throats varied according to the localities.

In some places, the benignant form predominated; adults were attacked more frequently: there were fewer cases which were not mild, and deaths were exceptional occurrences. Such was the character of the epidemic in some *communes* in the *arrondissement* of Hazebrouck, and in the *arrondissement* of Maçon, where in nearly 400 cases, there were hardly 30 deaths; in the *arrondissement* of Apt, where in 80 cases 4 were fatal; and in the *arrondissement* of Gourdon, where the mortality was 1 in the 100.

In other places, on the contrary, the occurrence of the benignant form was exceptional. The patients who recovered rapidly were few in number, and were always adults; but even in children, among whom the mortality was great, mortal diphtheria often began under the form of an herpetic eruption. That happened in the *communes* of Vien and Thiel in the *arrondissement* of Moulins; also in the departments of Charente-Inférieure, Deux-Sèvres, Meuse, Nièvre, Saône-et-Loire, as well as in other departments, where Drs. Castel, Dusouil, Madère, Plissard and Guillemaut pointed out, each in his own locality, the occurrence of simple sore throat in adults, and the transformation of the herpetic eruption into characteristic diphtheritic patches, which ran their fatal course.

These are the circumstances, Gentlemen, in which you must with redoubled vigilance watch your patients. These, also, are the cases in which there is not only no harm, but a great advantage—even when the herpetic nature of the sore throat is best characterised—in employing the same topical treatment that is demanded by diphtheria: it will not in any degree aggravate the common membranous affection.

LECTURE XVIII.

GANGRENOUS SORE THROAT.

Gangrenous Sore Throat from Excess of Inflammation.—Gangrenous Sore Throat Supervening as a Complication of severe diseases such as Dysentery, Typhoid Fever, &c.—Gangrenous Sore Throat as a Complication of Scarlatinous and Diphtheritic Sore Throat.—Primary Gangrenous Sore Throat.

Gentlemen:—The considerations into which I have entered in relation to membranous sore throat are equally applicable to the affections regarding which I to-day propose to address some words to you. The lesion, as I have already told you, is not a sufficient criterion by which to establish the diagnosis, and I showed you examples of pseudo-membrane appearing in sore throats essentially different in their nature. The same remark is applicable to gangrene.

Grangrene of the pharynx and tonsils is indeed sometimes, though very rarely, a termination of inflammatory sore throat; it results from excess of inflammatory action. The gangrene may also occur as a complication of a sore throat of specific character; as, for example, when it is an epiphenomenon in scarlatina, measles, or typhoid fever, or when it supervenes in the course of any other great epidemic disease—in dysentery, for example, as seen by you in the patient who lay in bed No. 11 of St. Agnes's ward.

The patient, as you will recollect, was a young lad who was admitted, on the 21st August, into the clinical wards, for a frightful dysentery which resisted every kind of treatment by which I endeavoured to subdue it. He died on the 19th October. At the autopsy, we found extensive ulcerations of the intestines, the lesions characteristic of epidemic colitis, and at many points, sphacelus of the mucous membrane. In this case, dysentery lent some of its malig-

nity to the constitution of the patient, who, from being exhausted by fatigue and misery, was in a condition of all others the most unfavourable for struggling against so formidable a disease. It was during the latter days of the patient's life, that we saw the pharyngeal affection come on. He complained of sore throat, and difficulty in swallowing: his voice was nasal. On examining the pharynx, we detected a dark grey patch on the right tonsil: the breath was repulsively fœtid, and characteristic. The slough had the appearance of being surrounded by projecting irregular edges, and the neighbouring parts were of a livid red. Cauterization with fuming hydrochloric acid, did not sensibly modify the character of the gangrenous surfaces, which were excavated by very deep ulcers. The sphacelus, however, did not extend in breadth beyond the parts primarily invaded.

Gangrene of the pharynx is rarely, though sometimes, met with in diphtheritic sore throat. When it occurs, it is as a complication of a pseudo-membranous affection, precisely as it occurs in scarlatino-membranous sore throat, in cutaneous diphtheria, and still more in diphtheria of the vulva, in which gangrene of the vagina is more common than in other forms of diphtheria.

Again, gangrene of the pharynx often supervenes in diphtheria as the predominant anatomical element in malignant sore throat. It is preceded by the appearance on the tonsils of plastic exudations more or less thick, and covering a greater or less surface. But the spots of exudation which first appear remain limited, and gangrene soon begins: it is at first superficial, but afterwards, it invades and deeply destroys the tissues.

Here is an example of this superficial gangrene.

On Monday 23rd April, Dr. Léon Blondeau, my former *chef de clinique*, was called about midday to a child suffering from membranous sore throat. The patient was a boy of three and a half years of age, of good constitution, who generally enjoyed excellent health. He had only been a short time resident in Paris. For about fifteen days, he had seemed out of health. He had an almost constant little cough: he was becoming thinner, and was losing the freshness of his complexion. He had been under the treatment of a physician who, having diagnosed membranous sore throat, vigorously cauterised the left tonsil with potassa fusa, there existing in that situation a whitish exudation, corresponding with swollen cervical glands. After the cauterization, he had on several occasions

practised insufflation of alum into the throat. On attentively examining the pharynx, there was seen on the left—the cauterised —tonsil, a greyish white, pultaceous looking deposit, which much more resembled the plastic exudation of common membranous than of diphtheritic sore throat. On the right tonsil, there was a thin layer of greyish opaline substance, and three or four semi-transparent spots like the vesicles of herpes. The swollen tonsils presented a bright red appearance around the places where the plastic exudation existed: the veil of the palate and the uvula were likewise red, but showed no trace of false membrane. The child complained of pain in the throat, and had some difficulty in swallowing. The fever was moderate; and there was nothing alarming in the general condition.

During the evening, a sort of thin slough became detached from the cauterised surface of the left tonsil, and the right tonsil was seen to be covered with an exudation similar to that which in the morning had covered the other: the cervical glands on the right side were swollen, and the swelling was greater than it had been on the left side. Both tonsils were energetically cauterised with the solid sulphate of copper. There was nothing particular to be seen on the uvula or veil of the palate. The voice was perfectly clear, and quite unaltered in tone. Swallowing seemed to be accomplished with some difficulty, a symptom which might arise from the pain caused by the inflammation which the cauterization had excited, and which, probably, was also the explanation of the child's repugnance to food.

On the Tuesday morning, there was found on the left tonsil a sort of slough, which had been observed to be partially detached on the previous evening; and on the right tonsil, there was a similar deposit, which also was becoming separated. These deposits covered superficial ulcerations of a deep red colour, and the redness extended to the mucous membrane of the veil of the palate and uvula. The glandular swelling was less conspicuous than on the previous day. The general condition was not changed. Notwithstanding the difficulty which he had in swallowing, the child took some broth. Till Wednesday evening, the disease had made no progress. A potion containing chlorate of potash, which had been prescribed when the symptoms first appeared, was continued: and the necessity of nourishment was insisted on.

On the Wednesday evening, the glands in the neck were very

painful and a good deal more swollen, particularly on the right side, where the cellular tissue was involved. The little patient complained of pain in the right ear. There was apparently, no sensible change in the state of the pharynx. It must be stated, however, that examination of the throat was attended with extreme difficulty, in consequence of the almost insurmountable resistance offered by the child. The sudden increase of the glandular swelling was alarming. Still, the prognosis was formed under reservation, because there was no sensible change in the general state of the patient: he took food more willingly than on the previous evening, and sat up in bed to play.

He passed a good night. Next morning (Thursday), the glandular swelling was found to have disappeared to a great extent. No new symptom was observed. By the evening, the aspect of affairs had completely changed. Although the child had asked for food, and had twice seemed to take with a certain amount of satisfaction the meat offered to it (declining bread however), there was a striking change in the physiognomy. A pale hue, a complete blanching, had taken the place of the till then natural colour of the skin. The eyes were puffy; and in the mesian line of the lower lip, there were two reddish brown spots, caused by the effusion of blood under the mucous membrane. The glandular swelling in the cervical region, which was still greatest on the right side, had again acquired the enormous proportions of the previous evening. The veil of the palate, rising up as high as the level of the tonsils, was greatly swollen, and of a livid red colour; but on bringing the nose as near as possible to the child's mouth, it was impossible to detect any characteristic odour. As the child submitted better to examination, the condition of the diseased parts was more easily ascertained. Two dark grey masses were seen floating in front of the ulcerations, from which they were detached, though still adherent to the parts by their inferior margin. When the ulcerations were touched, they yielded a mixture of blood and mucus, but at no point was there visible any trace of false membrane. The voice had preserved its natural tone: respiration was free, but it was noisy, as in persons suffering from inflammatory sore throat.

On the Friday, the condition of the child was desperate. At two in the morning, he had been seized with the most distressing restlessness and anxiety. His breathing was oppressed: his countenance had become frightfully pale: and his skin was covered with

a cold sweat. Just as the physician arrived, the agonies of death were beginning. The mental faculties, however, remained unimpaired. Respiration had that character of anxiety which it presents in malignant diseases: the inspiration was noisy, as in persons affected with œdema of the glottis. Although the voice was enfeebled, it was not altered in tone. The veil of the palate was much swollen: its entire surface was purple-red, this colour being deepest in the neighbourhood of the tonsils. There was a sanious discharge from the nostrils; but within them, there was no appearance of plastic exudation nor gangrenous spot. Such a state of matters afforded no room for a gleam of hope. Still, a large cup of coffee without milk was ordered, and a quarter of an hour after it had been taken, he was given some syrup of ether, when he took hold of the vessel and spoon presented to him. Speaking very distinctly, he complained of pain in the throat, and with his finger pointed out the situation of the swollen glands. Soon after the arrival of the physician, the child died suddenly in a faint.

Although it was impossible to obtain a necroscopic examination, the details of the case are sufficiently complete to leave very little room for doubting that there was superficial gangrene of the pharynx. The specially remarkable circumstance to which I wish to call your attention is, that the characteristic deposits of diphtheria occupied a very small surface, and remained confined to their original localities; and so, as I formerly said, gangrene became the predominating element of the disease.

Gentlemen, you will find recorded in different publications, and particularly in the "*Gazette Médicale de Paris*," and the "*Bulletins de la Société Anatomique*," a good many cases in which gangrene, supervening as a complication of diphtheritic sore throat, had deeply destroyed the implicated tissues. Allow me to place before you the details of one of these cases, as given in a paper published by Dr. Gubler in the "*Archives Générales de Médecine*" for May, 1857. The case is one of malignant membranous and gangrenous sore throat, complicated with diphtheria of the nasal fossæ.

The patient, a woman of 24 years of age, came into the wards of my colleague of the Beaujon Hospital on the 26th February, 1836. She had been confined four months previously; and it would appear that the infant had had the same disease as the mother. The woman stated that her child had had a hoarse cough, and had "coughed up skins," an important circumstance, as Dr. Gubler justly observes.

The woman had been ill for six days, at the date of her admission to hospital. Her attaek had commeneed with severe pain in the throat, and great difficulty in swallowing. The submaxillary glands on the right side were engorged and painful. The symptoms did not seem to have been ushered in by a febrile paroxysm.

At his first visit, Dr. Gubler observed that the woman eould hardly speak. Her voiee was snuffling, and artieulation was diffieult: but she was not without voice, nor was there any symptom to indieate that the larynx was involved. So great was the diffieulty in deglutition, that the patient dreaded the neeessity of swallowing as a punishment, though it were only the swallowing the saliva. Her mouth remained eonstantly half open to facilitate respiration, and give exit to the flow of saliva, and to the viscid mucus detached by the painful efforts to cough. The right submaxillary region was very swollen, hard, red, and painful. On examining the throat, a large greyish patch was seen on the right side of the isthmus of the fauees: it was easily detaehed by the handle of a spoon: it seemed to be a superfieial slough of a portion of mucous membrane, of whieh the dermis had been previously infiltrated by plastie products. The surfaee exposed by the removal of the patch was ulcerated and granular: it bled freely. Both nasal fossæ were equally involved, as was apparent from the snuffling character of the voiee, and from the respiration being exclusively performed through the mouth. A false membrane, soft in consistence, yellowish in colour, and differing in appearanee from the greyish patch already mentioned, was extracted from eaeh nasal fossa. The removal of these false membranes was followed by eonsiderable epistaxis. Upon examining the grey patches with the microseope, Dr. Gubler found that they were evidently sloughs of mueous membrane infiltrated by plastic exudation, and that the substances removed from the nasal fossæ were undoubtedly pseudo-membranous productions.

The patient was in great anxiety: she remained eonstantly sitting up, and her whole energies seemed coneentrated in her attempts to clear her mouth from saliva and viscid mucus. Her hands, which she always had out of bed, were very eold. The pulse was weak, small, and rather quiek: on the evening of the same day, it became quicker.

The affeeted parts were eauterised with pure hydrochloric aeid; and the nasal fossæ were twiee injeeted with a solution of nitrate of silver, the strength of whieh was forty centigrammes (6 grains) to

thirty grammes (11 drachms) of water. The patient was ordered decoction of cinchona, to which coffee was added; and there was also prescribed a julep containing two grammes of extract of cinchona. Some broth was given to her.

Next day, February 27th, it was observed that the glands situated below the chin were swollen: the diphtheritic patch (or slough) extended to the anterior surface of the veil of the palate, to the right margin, the point, and left margin of the uvula: on the uvula, there remained an isolated portion of healthy mucous membrane. The difficulty of swallowing had now become so much aggravated as to amount to an almost complete impossibility: the glandular enlargement was very painful on pressure: the nasal fossæ were more impervious than ever to air: the hands were cold, because they were always out of the bed. There was a good deal of fever, and the pulse was 100. The use of the decoction of cinchona with coffee was continued; and there were also prescribed a julep containing 4 grammes of chlorate of potash, a mouth-wash containing 8 grammes of the same salt, and an opiated liniment for rubbing over the cervical glands.

On the 28th, the general appearance of the patient was improved, and the anxiety seemed to be diminished: the pulse had fallen to 80 or 84, but it was small and sharp: the skin was cool, but not cold: the extremities had a somewhat violet colour: the glandular swelling was diminished, and there was less redness and tension of the skin over the glands. There was also an amelioration in the condition of the throat, and the isthmus of the fauces was less swollen: on the right pillar, there was a very apparent loss of substance: in that situation, the false membranes did not seem to have increased: the obstruction of the nasal fossæ remained. The treatment, as before, was continued.

On the 29th, there was a further diminution in the glandular swelling. At the lower part of the throat, sloughing surfaces were visible, and on the posterior part of the pharynx, there was a pseudo-membranous patch.

On the 1st March, the patient complained of severe pains in the ears, particularly when she swallowed: she had mentioned this symptom on previous days, but it had not before caused her so much suffering. These pains indicated that the specific inflammation was spreading to the Eustachian tubes: the hearing of the patient, nevertheless, was good: the nostrils were still obstructed, and this

obstruction arose from swelling of the pituitary membrane to which the nitrate of silver had been applied. The pharyngeal surface seemed to be less coated with false membrane and pultaceous exudation. Between morning and evening, the pulse rose from 80 to 100. A gargle of the decoction of marsh mallows and poppy heads was substituted for the chlorate of potash mouth-wash.

On the 4th, there was no longer any false membrane to be seen on the pharynx or uvula, but there was an uneven layer of it on the right pillar of the fauces.

Till the 6th, there did not appear to be any change in the general condition of the patient; but on that day, just as she was attempting to rise, she was seized with faintness and a desire to vomit. It was then observed, that there was paralysis of the veil of the palate: in drinking, the fluids were returned by the nose: the voice was very snuffling. There was, however, less obstruction of the nasal fossæ than formerly, and she had some power of snuffing up. She breathed freely through the right nostril, but not so well through the left. Consequent upon the administration of a purgative enema on the previous evening, she had had a little diarrhœa. She had had in the evening vomiting and epigastric pains: she described the pains as cramps and colics.

Next day—the 7th—her condition became very serious: the face had a pinched look: on the eyelids, over the cheek-bones, and on the lips, there was a purplish hue: the skin of the rest of the face was of a cadaverous yellow: the hands were livid: the tongue was pale: there was aphonia: and although there was nothing to show the existence of any pulmonary or cardiac lesion, the respiration was oppressed. The pulse had fallen almost incredibly low—to 22 beats in the minute. The patient was in a state of passive delirium, and looked as if in the algide stage of cholera. A cordial potion was prescribed.

On the 8th March, at the visit, the depression of the vital powers was as great as on the previous evening. Two days later, she died in a state of coma.

In this case, as in the previous case, an autopsy could not be obtained. But you will find in the medical periodicals, particularly in the "*Bulletins de la Société Anatomique*," similar cases in which were demonstrated after death, scalpel in hand, the formidable symptoms produced by sphacelus of the pharynx.

You perceive then, Gentlemen, that gangrene of the pharynx may

supervene as a complication of diphtheria. I have never denied that this may take place; but I have said, and now repeat, that this complication is rare. Moreover, I am convinced that there has very often been mistaken for gangrene that which was only gangrene in appearance. I need not, however, at present insist on this point, as I shall have to return to it at some length, when discussing the subject of diphtheria in future lectures.

But independently of secondary, there are different kinds of primary gangrene. The rarest of them all is gangrene from excess of inflammatory action. There is also a description of gangrene, which, supervening in the course of certain severe diseases causing profound prostration, such as dysentery, typhoid fever, small-pox, diphtheria, is a kind of *primitive gangrenous sore throat:* it ought to be looked on as a distinct disease, having as its fundamental character mortification of the mucous membrane of the pharynx, which resembles grangrene of the mouth, appears suddenly, and sometimes extends to the cheeks and lips.

Primitive gangrenous sore throat likewise comes on independent of any antecedent morbid influence, independent of epidemic influences which produce malignant diphtheritic sore throat: it sometimes attacks persons who seem to be in the full vigour of health, attacking them without any appreciable cause, and often causing death with a degree of rapidity, somewhat variable, but never in the sudden manner in which it occurs in malignant diphtheria, that frightfully formidable disease of which I shall have to speak to you. This affection, however, may terminate in recovery, as I had an opportunity of observing in the case of a young man whom I saw in consultation with Dr. E. Vidal.

This kind of gangrene is characterised by the presence of dark grey patches on the tonsils; the patches are sometimes quite black, surrounded by yellow excavated edges, which are more or less elevated, when, the affection having made progress, the slough has a tendency to separate from the soft parts. When the slough has separated, whether spontaneously, or in consequence of cauterization, a more or less deep ulceration is seen in its place. The gangrene may remain confined to one point; but there are other cases in which it gradually extends to the neighbouring parts, invading the veil of the palate, and the uvula (which it may destroy more or less completely), and taking possession of the back part of the pharynx and the aryteno-epiglottidean folds.

The mucous membrane surrounding the sphacelated parts assumes a livid red colour, and presents the characters of œdematous inflammation.

There is a characteristic fœtor exhaled with the breath: this fœtor, as is natural to suppose, is greater in proportion to the extent of the lesion. The gangrenous smell has been sometimes compared to the odour of fæces.

The patients complain of very acute pain in the throat, which pain is increased during deglutition. When the affection gains the veil of the palate, and even when it remains confined to the tonsil, speech is embarrassed and the voice is snuffling.

The cervical glands become implicated; sometimes the extent of their swelling is as great as in malignant diphtheritic sore throat: and at other times there is complete absence of glandular swelling, a symptom which is never absent in diphtheritic sore throat.

This disease is also recognised by the extreme severity of the general symptoms, which testify to the malignant nature of their cause, and to the general poisoning of the system. All the organic functions are greatly depressed; digestion languishes; there is loss of appetite; and the animal temperature is notably lowered: the skin of the extremities present that livid appearance which characterises the algide stage of cholera, and has a relation to the disordered state of the hæmatosis of the general circulation: but there is no fever. Indeed, so far from there being any fever, the pulsations of the heart and the pulse at the wrist are below the normal standard. Death is the consequence of depression of the vital powers; and the patients either die in a state of syncope, the mind, up to the last, being not at all or very little affected; or else they die in a state of coma.

The case which I am now going to relate, occurred under my own observation, and the report of it is drawn up by Dr. Millard. It will give you an idea of the symptoms which may supervene in this kind of gangrenous sore throat.

The patient, M. Mancel, was the son of a Parisian physician. He was twenty-three and a half years of age, a non-resident hospital pupil, tall, strong, of good constitution, and of nervous temperament. He had complained for several months of frequently feeling lassitude, and of falling into fits of low spirits without any cause. After a slight attack of stomatitis, he became very irritable, and from time to time was tormented with neuralgia. Under these cir-

cumstances, a perceptible change took place in his appearance; his physiognomy became somewhat altered, and the ordinary paleness of his complexion was sensibly increased.

On August 8th, 1853, he was seized, without any apparent cause, with rigors and a feeling of general discomfort. He could not take dinner, and went to bed. Next day, there was observed a seemingly slight inflammation of the left tonsil. There was not much fever, but there was a manifest prostration of the whole system.

Three or four days later, Dr. Mancel, being alarmed at the state of his son, called in to consult with him on the case, two hospital physicians, Drs. Boucher de la Ville-Jossy and Legroux. These gentlemen could detect nothing particular in the condition of the throat; but they were struck with the fœtor of the breath.

On the 16th or 17th of the month, I was sent for. I was at once struck with the gangrenous fœtor of the breath. On examining the pharynx, I found a gangrenous patch on the left side of the anterior pillar of the fauces; and the gangrene seemed to me to have a tendency to extend to the veil of the palate. I freely cauterised the parts with hydrochloric acid.

On the following days, I saw the patient in consultation with MM. Andral and Nélaton. We insisted upon the necessity of an essentially tonic general treatment, embracing good soup, generous wine, and cinchona. There was almost no fever: the digestive functions were in a pretty good state: the voice was snuffling, but it was a remarkable circumstance, that there was but little difficulty in deglutition. The breath was very fœtid. There was no thoracic complication. The complexion was exceedingly pale. This poor young man had, moreover, fallen into a state of great moral prostration.

Some days later, a very serious symptom, *double vision*, manifested itself.

During the night of the 27th and 28th of August, when his pulse was being felt, the patient for the first time complained of pain in the right fore-arm. Very soon, similar pains, then considered rheumatic, were felt in the other limbs; but forty-eight hours afterwards, we discovered that they depended on phlebitis of the superficial veins. The pulse had now become smaller and more frequent. The gangrene of the pharynx, however, though it had not become circumscribed, had extended very little. There was no difficulty in

swallowing. There was no enlargement of the glands, a circumstance to which I wish particularly to call your attention.

On the 3rd or 4th September, we observed that the left side of the upper lip was a little swollen: and we soon perceived a double gangrenous patch on that lip and the corresponding gum. There was some puffiness of the face, and considerable alteration of the features.

On the 7th September, the patient was seized with delirium, which ceasing only at intervals continued till death, which occurred during the night of the 9th and 10th.

LECTURE XIX.

INFLAMMATORY SORE THROAT.

Recovery is Spontaneous.—Distinct from Rheumatic Sore Throat.—Distinct also from the Sore Throat Caused by the Secretion from the Tonsils.

Gentlemen: There are some diseases which are both the glory, and the opprobrium of every kind of treatment: they terminate spontaneously in recovery, but no therapeutic measures can arrest their course. Inflammatory sore throat belongs to this class of diseases: and to-day, I propose to speak to you of a case in point, which you have lately seen.

The patient was a woman who lay in bed No. 1 of St. Agnes's ward. Consequent upon a chill, she was seized with violent pain in the throat. On the first day of the attack, she had no fever; but she experienced general discomfort, and the lymphatic glands on the left side of the neck were slightly swollen. Next day, she was received into the Hôtel-Dieu. She was then in a decidedly febrile condition. She complained of pain in the throat, and on examining the pharynx, I perceived that it was of a bright red colour, that there was some swelling of the left tonsil, and that on it there was a whitish patch formed by a thin layer of deposit, which, if it had not been looked at with some attention, might have been taken for diphtheritic exudation. The pains became more severe, while, at the same time, the fever increased. On the fifth day of her attack, this woman had great difficulty in swallowing fluids, which, by partly passing into the larynx, caused slight paroxysms of cough. These symptoms increased in severity; and on the sixth day, the parts implicated were more swollen, there was increased difficulty in deglutition, and an almost absolute impossibility of swallowing liquids, which returned by the nose. The voice was singularly modified in tone. The patient, suffering from a state of great anxiety, tormented by want of sleep and unappeasable thirst, implored me to give her

relief, which it was not in my power to bestow: but I expected nature, by her own unaided powers, to afford that desired relief. And so it was: for next day the great anxiety and the pain in the throat had subsided as if by enchantment. The cause of all the suffering had been an abscess situated behind the veil of the palate and in the left tonsil. Instant relief had been afforded by the spontaneous opening of that abscess; and forty-eight hours after this occurrence, the cure was complete.

The patient had had the affection called *tonsillitis, acute amygdalitis, inflammation of the tonsil, inflammatory sore throat,* or *inflammatory cynanche,* using *cynanche* in the sense in which it was employed by the old medical authors. I prefer the latter two names, because they do not define the seat of the disease, which, as a general rule, does not occupy the tonsil itself, but the cellular tissue surrounding it.

Inflammatory sore throat is, I repeat, gentlemen, one of the diseases which are at once the glory and the reproach of all kinds of medical treatment—the reproach, because medicine never prevails against them, in this sense, at least, that it is impotent in stopping the course or shortening the duration of the attack—and the glory, because they terminate in spontaneous recovery whatever we do, so that there is a temptation to ascribe to medicine the honour of the natural cure.

You are too well acquainted with the anatomical characters of quinsey [*esquinancie*] and its phenomena, for me to think it necessary to give you in this place a description which you will find in all your text-books. I shall, therefore, restrict myself to the statement of some general facts of practical utility. Let me point out to you that the free surface of the tonsils is very often covered with a whitish deposit, formed either by mucus or by a plastic exudation constituting a membranous patch. This deposit has a creamy, sometimes yellowish, aspect: it is not very adherent to the tonsil, not thick, and not consistent. It may deceive the eyes of less experienced observers, and suggest the idea that the affection is diphtheritic.

Inflammatory sore throat, once declared, does not recede any more than an inflammation of the arm. In the latter, you may sometimes usefully interpose by dividing the tissues rendered exceedingly tense by the inflammation, and by making incisions, you will afford egress to the pus which is going to be formed; but this

is not curing the inflammation, which, notwithstanding your interference, will follow not the less its natural course. It is not so in inflammatory sore throat. I know that it has been proposed, and you have read the proposal in the works which are in your hands, to scarify or cut the affected parts with lancet or bistoury: and it has been proposed to lacerate them in a more barbarous manner with Museux's forceps, upon the supposition that the proceeding would afford relief to the patients. These methods of treatment, Gentlemen, exceedingly open to objection in theory, are very little suited for practical application. I doubt whether they have ever produced the benefits expected of them; and I have seen cases in which they were positively injurious, by increasing, in place of moderating, the violence of the irritation.

Every kind of treatment has been put in requisition against this malady. For a long time, the antiphlogistic method was extolled, and there are still some who proclaim its efficacy in inflammatory sore throat. Bleedings from the arm, bleedings from the feet, bleedings from the ranine vein; bleedings called derivative, accomplished by applying leeches to the neck, the anus, or the vulva; the abstraction of blood by cupping from between the shoulders or from the sides of the neck—have been vaunted as being very useful. It has even been recommended—in the true spirit of Broussais—to apply leeches to the interior of the pharynx: but this singular fancy will not admit of discussion. Bleeding by phlebotomy is now generally abandoned in the treatment of inflammatory sore throat, but it is otherwise in respect of local depletion, for nothing is more common than to apply leeches externally over the angles of the jaw.

The revulsive treatment, a term applied to the administration of emetics and purgatives, has continued longer in repute. I believe that in some cases, when there is a saburral state of the alimentary canal, the employment of evacuants, particularly of ipecacuan, is indicated, but, except under such circumstances, their usefulness is very doubtful.

For the third time I repeat, that antiphlogistics, revulsives, topical astringents, and all other kinds of treatment, are without power to impede the course of inflammatory sore throat, the naturally short duration of which nothing can curtail, and the termination of which in recovery invariably occurs. During my very long medical life, I have never known death to occur from this malady.

This fact is enough to show you how far it is from being a serious disease. At the same time, however, while I announce, and while no one will deny, its benignity, I admit that it may sometimes bring death in its train. We can understand that death may result from the propagation of inflammation from the throat to the upper part of the larynx : that inflammation reaching the neighbourhood of the aryteno-epiglottidean ligaments may lead to œdematous infiltration of these membranous folds ; and that patients, under such circumstances, may be carried off in paroxysms of suffocation.

In how many days does the malady run its course? This important question was partly answered thirty years ago by my honourable colleague Dr. Louis.[1] Of twenty-three patients attacked with inflammatory sore throat, who were placed under observation, thirteen were, and ten were not, bled. The average duration of the disease was nine days in those who were bled; it was ten days and a quarter in those who were not bled. An energetic treatment, therefore, which appeared to shorten the duration of the malady only by some hours, cannot be said to have had more than an unimportant influence. It must be stated, however, that in some cases, inflammatory sore throat runs its course in a period much shorter than the average periods named by Louis; for the abscess sometimes opens on the fourth or fifth day. Very frequently, also, it happens, that when an amount of relief is experienced which leads to the belief that the cure is imminent, the opposite side becomes inflamed, and a period longer than in the first instance elapses before the pus finds its exit.

Acquaintance with these facts is indispensable, for they are directly applicable in practice. If we ignore the natural progress of diseases, we are tempted to interfere, and to interfere vigorously, in such a malady as that now under consideration, which sets in with a demonstration of such apparently formidable symptoms. In point of fact, inflammatory sore throat is accompanied by symptoms which regarded only in their external aspect look far more serious than those of diphtheritic sore throat. The latter makes its appearance insidiously : the disease silently makes rapid progress ; and death is often imminent, when the symptoms are only beginning to alarm the family of the patient. The former, on the other hand, sets in

[1] Louis :—Recherches sur les Effets de la Saignée dans quelques Maladies Inflammatoires, etc. Paris, 1835.

with more disturbance. From its very beginning severe symptoms manifest themselves, but though they may all at once assume a very alarming aspect, they never become desperate. Membranous sore throats of the most terrible description—those which kill by general toxæmia, without the pellicular inflammation having extended to the larynx—such malignant sore throats, Gentlemen, in general cause little suffering to those whom they carry off: they are much less painful than inflammatory sore throats, which, though presenting the most alarming appearances, are in reality devoid of danger. They, however, though not dangerous, cause intolerable pain, which is increased by the movements involved in deglutition, and is constantly being excited by the desire to swallow the saliva secreted in great abundance, or by the tickling sensation produced at the base of the tongue by the uvula enlarged in consequence of œdematous infiltration. The pain extends to the ear, from the inflammation being propagated along the Eustachian tube: it likewise extends to the jaw-bones and lateral parts of the neck. The unhappy patient swallows with the greatest difficulty, is unable to turn his head, and frequently can neither open his mouth nor move his tongue. There is a change in the tone of his voice, and sometimes he cannot speak: the respiration is embarrassed: and suffocation seems to be impending. In addition to these symptoms, which produce a very anxious condition in the patient, there is feverish excitement: the skin is hot, the pulse is full and frequent, the face is red and congested. In some cases, delirium supervenes.

A physician, who, believing that he had to do with a severe and serious disease, should deem it necessary to adopt more or less energetic treatment, would be confirmed in his erroneous belief; for he could not fail to give to his treatment the honour of a speedy cure. Let him not be in such haste to congratulate himself on his success, for very often, in place of having done good, his treatment has been mischievous.

The fact is, that spontaneous recovery takes place within nine or ten, and sometimes within four or five days. As soon as the symptoms of the sore throat have disappeared, there is an immediate return to health, and all that is requisite, is to take precautionary measures, with a view to prevent a relapse. But if the patient has been bled at the arm or leeched, particularly if he be a child or a delicate person, some time must elapse before he recovers from the exhaustion caused by the loss of blood. This consecutive anæmia

will be worse than the affection which has been so uselessly combated: it will induce debility, loss of appetite, impaired digestion, palpitation of the heart, and other nervous disorders. These symptoms will continue for a month or more.

I know, Gentlemen, how difficult it sometimes is to remain passive when patients are waiting to receive relief at your hands; and this difficulty is all the greater in consequence of inflammatory sore throat, one of the most painful of diseases, throwing those who are suffering from it into a state of great anxiety and impatience. Nevertheless, practitioners who have before passed through similar trials resign themselves to do nothing, knowing the course which the malady will take. A friend of mine, one of the most honourable physicians of Paris, has often suffered from quinseys in the course of his life. After having treated them on all possible plans, he has for a long time been in the habit of doing nothing. Upon one occasion, when we were talking about quinsey, he said to me:—"I am now very clever in the treatment of this affection: I give my patients barley-water when they are able to drink, and I prescribe foot-baths: to these measures, I restrict my treatment. I do better still in my own case—if better be possible—I confine myself to my bed-room and my bed, and wait patiently: my sore throats get well quite as quickly as they used to do." One of my hospital colleagues, who also, for the last ten or twelve years, has been subject to attacks of inflammatory sore throat, has adopted the plan of doing no more than the physician whose personal experience I have just quoted.

The expectant is consequently the best treatment which we can adopt in quinsey: but I admit that it is the most difficult plan to follow out in practice, particularly when the practitioner is beginning his career, and has not yet gained that confidence which he will afterwards acquire. To satisfy the justifiable impatience of your clients, prescribe for them remedies which are not very active. If you cannot in reality cure, you will at least be able to afford illusion to the sufferers, and will avoid disparaging yourself by an avowal of therapeutic impotence. Order acidulated soothing gargles, and emollient fumigations, though all the while you know perfectly well that they will contribute nothing to the cure of a malady which will cease spontaneously at its own appointed time.

I have already said that when inflammatory sore throat has once declared itself, it never goes back: you will, however, hear some men gravely maintain that they have cut it short during the first three

days. According to them, this happy result is sometimes brought about by the use of leeches, emetics, insufflations of alum, gargles of chlorate of potash, borax, and cauterization with the nitrate of silver. Let me endeavour to explain these facts.

In the first place, Gentlemen, where is the physician of skill sufficient to decide whether a sore throat which has just made its appearance is certain to be a quinsey? For my own part, I completely renounce all claim to ability to give a positive opinion under such circumstances, and I doubt whether others are more competent.

Besides inflammation of the pharynx, there is another kind of painful sore throat—the *rheumatic sore throat.*

A person subject to rheumatic pains, catches cold. Some hours afterwards, he feels acute pain in the throat, pain of such a character as to prevent him from swallowing a drop of water or even the saliva—the deglutition of very small quantities of fluid, occasioning much more suffering than the passage of the alimentary bolus. This is explained by the fact that to propel very small quantitites of fluid towards the œsophagus, the contractions of the pharynx must be more energetic than when it has to grasp a bulky body. Upon examining the affected parts, we see that the interior of the pharynx, and the veil of the palate are more or less red: the inflamed uvula is œdematous and elongated. All the phenomena of inflammation disappear with great rapidity, they, like other affections of a rheumatic character, being in their nature of short duration. In fact, on the next or the next following day after the beginning of such a sore throat, the pain will have disappeared as if by enchantment, and at the same time another pain will have taken possession of the neck, producing wry-neck: then, in twenty-four hours, it will be the shoulder which will be the seat of pain. Next day, the patient will complain of lumbago. As for the sore throat, its duration will have been about from thirty to forty-eight hours. If your diagnosis at the commencement of the attack was incipient inflammatory sore throat, and you have in haste used the therapeutic measures at your command, you will have led yourself to believe that you have cut short an inflammatory sore throat. The physicians to whom I have just been alluding, as having boasted of causing the abortion of attacks of inflammatory sore throat, were misled by having had to do with these rheumatic sore throats. Patients who have several times had this kind of sore throat will be quite as able to distinguish it

from inflammatory sore throat, as a gouty subject is to discriminate between the pain of gout and the pain of accidental arthritis: but the physician is, I repeat, unable at the beginning of an attack to decide whether a sore throat is rheumatic or inflammatory.

There is another form of inflammatory sore throat, about which I see very little in classical works; and of which I have shown you some examples in the wards. In persons subject to persistent chronic inflammation of the tonsils, it often happens that the secretions from the interlobular clefts become altered in character and thickened, so as to form small, fœtid, and irregularly shaped cheesy masses. These masses act as if they were foreign bodies, causing active inflammation and very acute pain: they frequently give rise to the issue from the tonsils of the little pointed concretions which you remember to have seen. The exit of these bodies is preceded by acute suffering and superficial ulceration; unless the physician, by using energetic pressure, squeeze out the small mass, so as at once to terminate a sore throat which is exceedingly painful, but far from being serious. Excision of the tonsils ought certainly to be recommended to persons very subject to this form of sore throat.

LECTURE XX.

DIPHTHERIA, OR MAL EGYPTIAQUE.

Gentlemen:—For several years past, reports sent to the Academy of Medicine, and communications to the scientific journals, have been calling attention to deadly epidemics of diphtheria in different parts of France, epidemics which have not spared the departments of the south, the centre, the north, west, or east. Similar epidemics have also been prevalent in foreign countries—in England (where for sixty years diphtheria had almost been unknown), in America, Germany, and Spain. This terrible scourge, diphtheria, has consequently of late more than ever awakened the attention of the public and of the medical profession. In fine, the numerous cases which have recently occurred in our clinical wards put me in a position to lay before you my views on this important subject; and it is my duty to do so. I intend, therefore, in consecutive lectures, to speak of this disease, which is one of the severest scourges of humanity. I do not propose to treat the subject in an exhaustive manner: I only mean to discuss the most practical points, and to take my illustrations from cases which we have seen together. Do not suppose, however, Gentlemen, that I am going to give you complete narratives, nor even abstracts of the numerous cases of diphtheria which have been reported under your observation: while I shall make profitable application of them as we proceed with the subject, while I shall likewise support my propositions by references to my private practice, to the experience of my colleagues, and to that of different authors who have written on the disease, I shall avoid giving long histories, and quote no more details of cases than are necessary to enable you to understand my argument. I shall also insist, Gentlemen, upon the necessity of adopting a mode of treatment, of which the utility even is at present disputed: I shall oppose this deplorable tendency to stray from that right path which has hitherto been followed by the best observers.

Diphtheria is pre-eminently a specific disease. It is contagious. Its manifestations appear on the mucous membranes and skin; on both, it presents similar characters. I say that it declares itself on the mucous membranes and skin, because diphtheria really has that character in common with specific and contagious diseases, such as the eruptive fevers and syphilis; but with this difference, however, that it does not attack the external integument, except when denuded of epidermis. Diphtheria shows a marked preference for the pharynx, for the air-passages and particularly the larynx, constituting the affections commonly known as membranous sore throat [*angine couenneuse*], or malignant sore throat [*angine maligne*], formerly designated gangrenous sore throat [*mal de gorge gangréneux*]; and suffocative sore throat [*angine suffocante*], now more particularly called croup [*croup*], in which the larynx is the chief seat of the disease. Diphtheria, also, often invades the mucous membrane of the nose, mouth, vagina, prepuce, and glans penis. Of all its forms, pharyngeal, laryngeal, buccal, nasal, vaginal, anal, or cutaneous, the *pharyngeal* is by far the most common. In some epidemics, it almost exclusively assumes the pharyngeal form, carrying off its victims by croup, the disease extending to the larynx and trachea. This is a form of diphtheria very different from that which kills by a sort of general poisoning, like septic and pestilential diseases. The attention of observers has always been more particularly directed to the pharyngeal form, because it is the most common: it is the form described by writers of bygone centuries—it is the typical form of Bretonneau's treatise on diphtheria,[1]—and it is with the consideration of this form that we shall commence the study on which we are now going to enter.

[1] Bretonneau: — Recherches sur l'Inflammation Spécia'e du Tissu Muqueux et en particulier sur la Diphthérite. Paris, 1826.

Diphtheritic Sore Throat and Croup. [Pharyngeal and Laryngeal Diphtheria.]

Occurs in all Climates and all Seasons.—Chiefly attacks Children.—Manner in which it is Propagated.—Glandular Swellings.—The Colour of the False Membranes: their Smell simulating that of Gangrene.—Its propagation to the Larynx.—Croup.—Intermittance of Symptoms.—Generally proves Fatal when its Progress is not Stopped.

A boy four years of age, when in perfect health, was seized with sore throat, which at first was of so slight a character as not to alarm his family. After one or two days, it was observed that the boy was losing his colour, that he was duller than usual, and indifferent to his ordinary games. He had some cough, but no fever, and although he ate with diminished appetite, he kept up all day. It was by the merest chance that the nature of his malady was discovered. The family physician having been called in to another child, who was suffering from epileptic vertigo, was accidentally consulted. He was struck with the pale skin; and he observed slight swelling in the submaxillary region: forthwith perceiving swollen glands, he examined the throat, and found that the pharynx and tonsils were bright red, that the tonsils were enlarged, and that on the right one, there was a greyish, rather thick false membrane. He came to the conclusion, that the case was one of diphtheritic sore throat; and at once vigorously cauterised the affected parts with solid nitrate of silver, and detached the false membrane by means of the caustic. During the same evening, and on the morning and evening of the following day, the cauterization was repeated. In the intervals between the applications of the nitrate of silver, insufflations with powdered alum were employed. In accordance with the express orders of the physician, the little patient got nutritious diet, and a tonic mixture the chief ingredient of which was wine of cinchona. The malady was stopped from going further: the general paleness, however, continued for some time longer, and ere long paralysis of the veil of the palate supervened. The child was sent to the country, whence he returned in six weeks, in perfect health.

The case I have now described is one of pharyngeal diphtheritic

sore throat—ordinary pharyngeal diphtheria. The insidious onset of the disease, the mildness of the general symptoms, the absence of fever at the time when the physician discovered the symptoms, the low spirits of the child, the paleness of the skin, the swelling of the submaxillary glands, and the presence on the right tonsil of the characteristic pseudo-membranous exudation superabundantly justified the prompt diagnosis. The paralysis of the veil of the palate which supervened some days later, still further confirmed it; and I have no doubt that the energetic treatment which was employed from the very first, cut short the disease, which might under other circumstances have gradually extended, got possession of the larynx, and produced croup.

This pharyngeal diphtheritic sore throat is met with in all seasons and in all climates. Not without a certain degree of surprise, I have somewhere read that this disease is chiefly observed in northern countries and in cold moist climates, while it is almost unknown in the south of France and in Italy. The person who put forth this singular opinion[1] must have had a very imperfect acquaintance with the history of medicine, not to know that the disease was described by Aretæus; that it is just membranous sore throat; that it was endemic in Egypt and Syria, having from that circumstance received its names of *Egyptian* and *Syrian ulcer*, names which, as is stated by Bretonneau, were given to it in the epoch of Homer rather than of Hippocrates. He must, I would farther remark, have been imperfectly acquainted with the history of medicine, not to have known that Carnevale, Nola, and Sgambati have left us accounts of epidemics of *morbus strangulatorius* which prevailed in Italy at the beginning of the seventeenth century, when similar epidemics were observed in Spain by Villaréal, Fontecha, Nuñez, Herrea, de Heredia, Mercatus, and Tamajo. At the present day, throughout all France, as I have said, we still meet with similar desolating epidemics of this kind of sore throat.

Diphtheria spares no particular age: it chiefly, however, attacks young subjects, and generally those who are between three and six years old.

[1] An exactly opposite statement was made by Wedel, an author of the last century, who stated that diphtheritic sore throat which he called *angina infantilis contagiosa* was more frequent in Italy than in the north of Europe:—"*in Italia frequentior quam apud Boreales Europæas.*" [De morb. infant., cap. xx, pag. 77.]

It begins with a more or less decided redness of the pharynx, with swelling generally of one, but sometimes of both tonsils. Soon afterwards, there is seen on the affected part a sharply defined whitish patch, at first formed by a layer of what looks like coagulated mucus: it is semi-transparent, grows concrete and thick, and very soon assumes a membranous consistence. This exudation, immediately after its formation, is easily detached, as it only adheres to the surface on which it rests by very slender filaments extending into the muciparous follicles.

The mucous membrane under the patch is perfectly healthy, even close to where the epithelium is destroyed: if it sometimes has an appearance of being hollowed out, this arises from its being swollen around the exudation, so as to form a sort of cushion with a hole in the middle. The occurrence of ulceration is exceptional. Generally, I repeat, the mucous membrane is healthy, or it presents no other change than an increased vascularity. On cautiously detaching the false membrane, there is not the slightest oozing of blood: it can, moreover, be often shown, with the aid of the microscope, that, on its surface which adhered to the mucous membrane, the epithelium remains with its vibratory cilia intact.

Some hours later, the pseudo-membrane, more prominent, convex towards its centre, and thin at its edges, has increased in size, and covers more of the tonsil: it has now assumed a yellowish-white colour, and is becoming more and more adherent to the parts first affected. The colour may vary from yellowish white to deep yellow, or even to grey or black. Generally, when the veil of the palate begins to be inflamed, the uvula becomes swollen: after some hours or a day, the side of the uvula next the tonsil which is covered with false membrane, becomes covered with a similarly coloured exudation. Often, within twenty-four or thirty-six hours, the entire uvula is enveloped like a gloved finger. At the same time, upon the other tonsil, a similar patch has appeared, and will soon cover it. The back part of the pharynx, thus commencing to be as it were carpeted on both sides, by and by exhibits long, narrow, longitudinal striæ of a deep red colour, amid which forms a little band of concrete matter; and then patches of false membrane appear, which finally unite with one another. From this time, if the child be docile, submitting easily to the examination required, and allowing the tongue to be quite depressed, a view is obtained of the uvula, both pillars of the veil of the palate, both tonsils, and the back of the pharynx com-

pletely covered with the coating which I have described. When an attempt is made to detach these false membranes with forceps, they can be torn off in strips: in this way I have removed from the uvula a pseudo-membranous envelope shaped like a thimble.

Generally, from the very beginning of the attack, the lymphatic glands at the angle of the jaw, those, therefore, which correspond with the first affected tonsil, are turgid. This, Gentlemen, is an almost invariable phenomenon, or at least, it is not wanting once in ten times. Its importance, therefore, is great, and all the greater that in common membranous sore throat, a malady generally mild but liable to be mistaken for that now under consideration, this glandular engorgement is entirely absent, or, if it exist at all, is present in a much less degree than in pharyngeal diphtheria.

At the invasion of the disease, the fever is pretty high, but after the second day, it begins to subside, and by the third or fourth day has quite disappeared: the patient then only experiences in a slight degree feelings of general discomfort, as indicated by prostration, low spirits, and a certain amount of weakness. Sometimes, the only thing of which he complains is a difficulty, often very slight, in swallowing; so that, in general, at the beginning of the attack, there is nothing to occasion much alarm.

When left to itself, the affection generally remains from three to six days confined to the pharynx. The older the subject, the longer is the disease in becoming developed by progressively invading the parts accessible to sight. False membranes form more rapidly in children than in adults, from the greater plasticity of the blood in the former. In children between three and six years of age, both tonsils and the posterior part of the pharynx may be coated with diphtheritic exudation in about thirty-six or forty-eight hours, whereas in adults, and still more in old people, from five to eight days may elapse before all the parts are invaded.

In patients who allow a thorough examination of the pharynx to be made, the false membranes can from day to day be seen to grow thicker by the addition of the new layers which form below those first formed: these different deposits assume a stratified arrangement. The pseudo-membranous layers which are most superficial become soft, and are easily torn. The membranous patches, altered in colour by the alimentary substances, drinks, and medicines taken by the patient, by matters vomited, or by blood from the pharynx and posterior nares, become greyish or blackish, so as to resemble a

gangrenous slough. Under these circumstances, the false membranes are the more liable to be mistaken for gangrenous sloughs, that they become putrid, and exhale a disgustingly fœtid odour. This, Gentlemen, as you will recollect, is what took place in a girl twelve years of age who was lately under our observation in St. Bernard's ward. Her breath had an intolerably gangrenous smell, and when with the assistance of a dossil of lint, I removed the detritus covering the tonsils and veil of the palate, I found that it consisted of a greyish matter which exactly simulated gangrenous detritus: but so far from being gangrenous detritus, when the mucous membrane of the affected parts were wiped, that is to say, the mucous surface which had been covered with this detritus, it appeared red, hardly excoriated, and certainly presenting no trace whatever of gangrene.

The resemblance to gangrene which invests the diphtheritic product is a point of sufficient importance in relation to the question before us to justify me in pausing for a few minutes to consider it. It explains to us why diphtheritic, was for so long confounded with gangrenous sore throat, and why it got the names of "*angine*" and "*mal de gorge gangréneux*," still applied to it by many physicians.

In studying diphtheritic sore throat in the child, and comparing it with the disease as seen in the adult, it is found that in the former it has very seldom, and in the latter very commonly, a gangrenous aspect. Are we to conclude from this fact, that gangrene really exists in the diphtheria of adults? No: its existence is only apparent; true gangrene, except in extremely rare cases, is not met with in the diphtheria of adults more than in the diphtheria of children: in my whole medical career, I have only met with three such cases. I readily grant, however, that such statements do not easily obtain credence. Even now, although I have ascertained that gangrene is an exceedingly rare occurrence in diphtheria, although I know perfectly well that at the termination of the case, whether the issue be recovery or death, I shall be able to demonstrate either on the living subject, or on the dead body, as the case may be, that the mucous membrane is devoid of even the slightest trace of sphacelus; although I know that I shall find only in some cases a few small excoriations, I am still, at the first glance, unable to shut out completely the idea of gangrene. In the young girl, our patient in St. Bernard's ward, I was perfectly certain that this gangrene did not exist, and you, too, held with confidence the same opinion: nevertheless, struck with the horrible fœtor of the breath, and

seeing the greyish flesh-like pulp which covered both tonsils, we could not prevent ourselves from thinking of mortification of the mucous membrane, sphacelus of the subjacent cellular tissue, and a still deeper destruction of parts. Thus, Gentlemen, you can understand, how diphtheritic has been confounded with gangrenous sore throat: thus, also, you can understand how some physicians still confound the two diseases, and why in the accounts of epidemics of croup, there is such frequent mention of gangrenous sore throat, when in reality the affection is pellicular or pseudo-membranous.

Let me add a few words on the manner in which the membranous exudations are circumscribed in the situations in which they are formed. Sometimes, they are surrounded by a bright red border: at other times, they seem not to be encircled, and thus, as I told you, at the commencement of the lecture, the pseudo-membranous deposit becoming thinner at the edges, shows itself on the neighbouring parts. In the latter case, we have more cause to dread the disease spreading than in the former.

It is true that pharyngeal diphtheria if left to itself may remain confined to the pharynx, and Bretonneau himself has cited examples of this, which indeed is not uncommon in some epidemics; but generally, it extends, when preventive measures are not employed. In some cases, it reaches the œsophagus, and even proceeds to the cardiac orifice of the stomach. The illustrious physician of Tours has recorded two examples of this, and similar cases have also been mentioned by Borsieri: almost invariably, however, it invades the larynx and trachea, constituting what is called croup. Such is the usual course, and most common termination of diphtheria. In point of fact, we see many more of those who are attacked by this disease die from croup than from malignant sore throat, of which I shall afterwards have to speak, which proves fatal after the manner of septic diseases.

The propagation of the diphtheritic affection to the larynx was long ago fully recognised. Aretæus has described it in his chapter "De Tonsillarum Ulceribus," where you will find the earliest notice of membranous sore throat: he speaks of it under the designation of *ulcera pestifera*, and refers to the names "Egyptian" and "Syrian Ulcer," by which it was then designated. Read in the annals of medicine the histories of epidemics which are therein recorded, and you will see that not only was the extension of the disease to the larynx perfectly well known, but was a subject which specially

engaged the attention of physicians. By whatever name the laryngo-tracheal affection is called, it is almost universally recognised as the cause of death. It is then, I repeat, by croup that the victims of laryngeal diphtheria are killed. I am not at present speaking only of sporadic, but also of epidemic diphtheria.

Such are the symptoms of the affection which, in the seventeenth century, was called *garrotillo* by the Spaniards, and *male in canna* by the Italians. The name given to it by the Spanish and Italian physicians was *morbus strangulatorius:* the Americans called it *suffocative sore throat* at the close of last century, and it is at present known to us by the Scottish name, *croup*.

You have had, Gentlemen, only too many opportunities of seeing the laryngeal symptoms in patients brought into the hospital at different stages of the disease. You had once an opportunity of observing their commencement.

The subject of the case to which I refer was a boy of eighteen months. He came into the Hôtel-Dieu along with his mother. Both were affected with very confluent sudoral eruptions, but were not otherwise out of health. Six days, however, after their arrival in our wards (where there was a child with croup and a woman with pseudo-membranous sore throat), the mother complained of sore throat. On examination, we found the right tonsil and the uvula coated with false membrane, and the cervical glands enlarged. I immediately cauterised the affected parts with hydrochloric acid: next day, the membranous deposit had almost disappeared, but in twenty-four hours it was reproduced in greater abundance, and in a thicker layer than at first, upon the uvula as well as upon both tonsils. The cauterization was repeated, and it was practised again on the following day, although an appreciable amelioration was noted, and which did not turn out deceptive. This patient recovered.

Her child, however, was attacked three days after her own seizure. In the child we observed a thick, whitish concretion upon the right commissure of the lips, which was slightly excoriated. I cauterised the part: and, taking into account the age of the subject, I told you that danger was impending.

On the second day, the diphtheria had taken possession of both commissures: but the tonsils as well as pillars and veil of the palate presented nothing abnormal, not even redness. On the following day, there was a diminution in the thickness of the false membranes

on the lips; but it appeared to me that the child's voice was becoming hoarse. When my *chef de clinique*, Dr. Moynier, made his evening visit, he observed hoarseness and a cough which had a hissing character: the voice was muffled. The patient had had fits of suffocation during the day. The disease had in no degree extended to the tonsils or palate. An emetic was prescribed. When I saw the patient fourteen or fifteen hours later, I learned that the suffocative attacks had become so violent and so frequent that tracheotomy had been deemed necessary. The operation was performed by the *interne* on duty. At the moment of opening the trachea, a false membrane was expelled. I found the child free from fever, and the neck much swollen: it died during the day. On the morning of the day on which it died, I detected the presence of pneumonia of the right lung, characterised by a blowing sound, dulness on percussion, and oppressed breathing.

At the autopsy, we did not find any deposit on the tonsils or veil of the palate, but the larynx and trachea were invaded by false membrane, which extended even to the most distant bronchial ramifications. The characteristic lesions of pneumonia were found throughout the whole of the lower lobe of the right lung, as well as disseminated in several parts of both lungs.

The presence of *croup* is first announced by a small dry cough, which comes in quickly succeeding fits of short duration. The voice, up to this time unaffected, now becomes a little changed, and, like the cough, has a special character, with which it is important to be acquainted: it does not admit of description, but can never be forgotten once it has been observed.

The cough is not sonorous and loud, but on the contrary is hoarse, muffled, and has a sound which may be compared to the distant barking of a puppy. The term *croupy* [*croupale*] conveys a false impression, and is much more applicable to the cough of laryngismus stridulus or false croup. The cough is at first very frequent, but it generally loses that characteristic as the disease advances.

After a short time, the breathing is affected. The *difficulty of breathing* occurs at an earlier period in children than in adults. It usually begins during the night; and there is produced at the same time a laryngo-tracheal whistling sound at each inspiration, which is also, but less audibly, heard during expiration. This whistling sound is best marked after each fit of coughing: it is caused by an

inspiration short, dry, and metallic-sounding, which can be quite well heard at some distance. On auscultating the trachea and posterior part of the chest, this sound strikes so strongly on the ear as to mask the murmur of the vesicular expansion. The causation of this laryngo-tracheal whistling is explained by the mechanism of the vocal apparatus. The sound is louder during inspiration, because the lips of the glottis have then a tendency to approach each other, thus increasing the difficulty of the entrance of the air, whilst, on the contrary, during expiration, the lips tend to separate. Generally, the pain felt in the larynx is not severe, but it is excited by the fits of coughing: it is not confined to the larynx, but extends to the trachea and anterior part of the sternum.

The disease goes on increasing in severity, the false membranes extending and thickening: the cough, however, goes on diminishing in frequency, the fits occurring only at intervals of a quarter of an hour, half an hour, or even longer: it also loses some or all of its hoarseness. The voice itself, which had a hoarse and somewhat metallic sound, in its turn fails, and the patient often becomes voiceless. Aretæus said:—*vox nihil significat.* The symptoms which generally accompany difficulty of breathing in pseudo-membranous laryngitis are evidence of the presence of diphtheritic deposit on the lips of the glottis. You can see at once why this should be so. You are aware that a little mucus adherent to the vocal cords is sufficient to change the tone of the voice, to make it hoarse, and sometimes even to occasion aphonia. It is not surprising, then, that the formation of false membrane on the lips of the glottis should be a still more decided cause of loss of voice. What occurs is exactly what takes place when you place a piece of wet parchment between the reeds of a clarinet or bassoon: the correctness of this comparison is enhanced by the great similarity which false membrane bears to parchment swollen from being wet. The reeded instrument constituted by the larynx is in this way made unfit to perform its part: the voice and the cough become more and more changed as the deposit increases on the vocal cords, and at last they both cease. This is a physical phenomenon which is perfectly explained by the arrangement of the parts concerned. On some rare occasions it happens that the hoarse cough returns, and that the metallic voice is again heard in consequence of violent expiratory efforts having occasioned the detachment and expectoration of the false membrane; or, it may be that the false membrane which coats the glottis is so

thin as not to prevent the air from vibrating as it traverses the larynx. Speaking generally, it may be said that the cough, at first croupy, becomes less and less sonorous.

I have said that difficulty of respiration supervenes in the infant after the lapse of a very short time, and that it likewise occurs in the adult, but not at so early a stage: this symptom rapidly increases in severity. There then sometimes occurs a phenomenon to which I must call your attention, because it may mislead you as to the nature of the disease, or at least induce you to put faith in the efficacy of the treatment which you have employed. Although the laryngeal lesion continues, although there is a permanent mechanical obstacle to the passage of air, although the false membrane which occasions this obstacle remains adherent to the vocal cords, the difficulty of breathing is intermittent. A child or an adult may have during the day several fits of dyspnœa, proceeding even to suffocation. During the intervals between the fits, if the patient is not agitated by the presence of the physician or any other cause, if nothing occurs to quicken respiration, it is nearly as regular as in a person in health, and no laryngeal whistling is audible. But from time to time, at first, every hour or every two or three hours, and then at shorter and shortening intervals, a suffocative fit comes on without any immediately exciting cause. The patient sits up, and sometimes gets up abruptly, to search out of bed, for that air in which he stands in need. He makes immense efforts to breathe, throwing back the head, opening wide the mouth, and convulsively contracting all the muscles which co-operate in respiration. The suffocative fit, which lasts from four to six minutes, is succeeded by a calm which lasts for a certain time.

These facts, pointed out by Royer-Collard,[1] and Bretonneau,[2] did not escape the observation of our predecessors. I cannot resist quoting to you the words of Borsieri, who has specially devoted to this subject a paragraph of his chapter on croup. It is entitled "*Fallax morbi mitigatio*"; and is to the following effect:—"Animadvertendum quoque est non rarò et subitò præter rationem, et *sine ulla materiæ obstruentis excretione* omnia sic in melius verti, ut liberior, imò naturalis omninò respiratio reddatur, ut infantes puerive e lecto

[1] Royer-Collard:—Dictionnaire des Sciences Médicales.
[2] Bretonneau:—Traité de la Diphthérite.

surgere et obambulare possint : paulò post verò fallaci hinc symptomatum quicti novum repente succedere insultum, sæpe numero gravem."

This intermittence in the suffocative symptoms has been justly attributed to a spasmodic stricture of the glottis, caused by the inflammation of the mucous membrane of the air passage, or by the presence of the plastic lymph poured out into its cavity : it may also depend upon a combination of both these causes. This is the opinion of Nicusseux, of Albers of Bremen, of Jurine, and of the members of the Academy commissioned to report on the papers submitted in the competitive examination of 1812. Farther, the commission, adopting the views of Albers of Bremen, said that the pseudo-membranous deposit sometimes formed a purely mechanical obstacle to the entrance of air into the bronchial tubes ; that most commonly it was spasm alone which, by narrowing the air passage, stopped and impeded respiration. Bretonneau disputes the accuracy of this explanation : according to him, the mechanical obstacle occasioned by the formation of false membrane explains everything. "As to the intermissions," he says, "they belong to a numerous class of pathological phenomena. Where is the practitioner who has not observed them ? Is not the pain of cancer, stone, and other diseases intermittent, though its cause is permanent"? Though the element *spasm* does not in my opinion hold the important place assigned to it by some in croup, it yet, I think, plays a very important part in this affection, as well as in the chronic diseases which my illustrious master uses as illustrative examples in his sentences just quoted. From the importance of this subject, I shall afterwards return to it : and I shall specially have occasion to revert to it, when I speak of symptomatic affections of the nervous system, particularly of angina pectoris and asthma.

To continue the description :—The suffocative attacks follow one another more rapidly, and at the same time become more and more violent : very soon, there is no interval at all, the suffocative struggle being continuous up to the agony of death : the laryngeal sound also becomes permanent. From time to time, the poor children, in a state of excitement which it is impossible to describe, suddenly sit up, seize their bed curtains and tear them with convulsive frenzy : they sometimes strip off the paper from the wall with their nails : they throw themselves on the necks of their mothers or of those about them, embracing them and trying to clutch whatever they can as a

something to hold by. At other times, it is against themselves that they direct their impotent efforts, grasping violently the front of the neck, as if to tear out from it something which was suffocating them. The puffy, purple face, and the haggard sparkling eyes express the most painful anxiety and the most profound terror: the exhausted infant then falls into a sort of stupor, during which respiration is difficult and hissing. The face and lips are pale, and the eyes sunken. At last, after a supreme effort to breathe, the agonies of death begin, and the struggle ends without there having been any severe suffocative symptoms such as might have been looked for from the previous attacks.

In adults, the picture is still more frightful. The violence of the suffocative attacks, the sort of frenzy which takes possession of the dying subject, vainly struggling to get rid of the obstacle to respiration, it is impossible to depict. At last, when the lips have become livid and the face turgid, when asphyxia has reached its last stage, the adult, like the child, falls into a state of stupor, and dies generally in a state of prostration. To use Borsieri's words:—"Sic irrequieti assidue jactantur, donec penitus prostrati jaceant et strangulati pereant." I say *generally*, because in some exceptional cases the patient is carried off by a fit of suffocation.

As I have already remarked, the intermittence of the suffocative fits is a fact very important to be acquainted with, inasmuch as ignorance of it might lead you into error. Suppose, for example, that having been called in to a case of croup, you resorted to some particular treatment, that you applied leeches, abstracted blood from the arm or foot, gave an emetic, or applied a blister to the front of the neck or to the chest; and suppose further, that immediately after you had done one or more of these things, there occurred one of those intervals of calm of which I have spoken, you might ascribe this to the efficiency of your treatment, while, nevertheless, the disease had only followed its natural course. It is important, therefore, to be aware of the fact, that, independent of treatment, the suffocative fits are intermittent. Besides intermittence depending upon the element of spasm entering into the case, there is also intermittence arising from expulsion of the false membrane which causes the suffocative attacks.

It happens sometimes—once, perhaps, in six or eight times—that in a paroxysm of vomiting or cough, the larynx is all at once cleaned, the child or adult discharging strips of false membrane or membranous

tubes, which come from the glottis and windpipe. When this occurs, there is all at once as complete quietude as if tracheotomy had been performed. The patient falls into a tranquil sleep, and may remain quiet for six, eight, ten, fifteen, or twenty-four hours. The relations then entertain hopes of recovery, in which the physician even is tempted to participate. He, however, cannot lose sight of the fact that diphtheria is a disease, which, though it occasionally grants a respite, does not as readily bestow a pardon. He cannot forget that when a false membrane is detached from the larynx or trachea, another begins to form in its place: that the exudation, passing anew through its stages, again covers the parts with a layer which at first thin, gradually becomes thick, and so at last re-establishes the obstacle which formerly existed.

Suffocative attacks, similar to those which formerly occurred, will take place, and if, as before, the new diphtheritic deposit should be expelled, there will always be a fear of its again forming. I have seen children expel three or four successive pseudo-membranous formations, and sink at last from the disease. However, I must also add, that I have seen in a few rare cases, ultimate recovery after the spontaneous expulsion of false membranes. But so exceptional and rare are such cases, that during the whole of my long professional career, I have only met with six, though the number of cases of croup, both in adults and children, which I have seen, is great.

It is a remarkable fact, that although the expulsion of the false membranes undoubtedly offers favourable chances of recovery to the patient, they are less favourable when, recovery not having taken place spontaneously, one is forced at a later stage to resort to tracheotomy. In other words, the operation will be less likely to succeed in a child who has discharged false membranes, than in one who has not: you will at once perceive the reason of this.

The presence of pseudo-membranous products in the larynx and trachea show, that the diphtheritic inflammation has reached them. After tracheotomy, the extension of the inflammation seems to cease. The expulsion of diphtheritic products, by retarding the crisis at which operative interference becomes imperative, allows the inflammation to extend in such a way, that in a child who has got rid of pseudo-membranous tubes, whether by the efforts of coughing or vomiting, and who has in consequence experienced temporary amendment and in whom the necessity for operating has been thereby postponed for forty-eight hours, you run the risk of having the bronchial

tubes invaded with false membranes, even to their remote ramifications; whereas, in another who has had at the beginning tracheotomy performed, followed by expulsion of false membranes, this state of matters will be rarely found.

I have already said that in rare cases—cases, however, which are not so rare as is commonly believed—the disease in place of pursuing its usual progress from the pharynx to the larynx and trachea, follows the opposite course, and attacking in the first instance the trachea, or beginning even in the bronchial tubes, ascends to the larynx. Finally, diphtheria, declaring itself simultaneously in different situations, may at the first onset of the disease exist in the interior of the larynx, trachea, and bronchial tubes, while it is also manifested in parts accessible to sight.

This is what took place in the little boy of St. Bernard's ward, of whose case I have just been speaking. I will now relate another similar case which occurred in the Children's Hospital, and was reported by Dr. Léon Blondeau during his *internat* there under Dr. M. P. Guersant.

A little boy of three and a half was admitted on the 9th of November, 1847, to the Hospital in the Rue de Sèvres, presenting all the characteristic symptoms of croup. On Saturday, 30th of October, he had been seized with fever: on the Tuesday following, the eruption of measles was observed: it was of moderate intensity, but the morbillous catarrh was very severe. On the Saturday, and still more on the Sunday, attention was drawn to a decided embarrassment in the breathing, and a hoarseness in the voice, both of which progressively increased.

When the child was brought to the hospital, the following symptoms were observed. The face was pale, and of a livid tint. There was considerable dyspnœa. The nasal fossæ were obstructed by a thick greyish mucous; but on carefully examining the throat, no appearance of false membrane could be detected. The patient was made to vomit, but not even temporary amendment resulted from this proceeding. The excitement and oppression were extreme. The pulse was 120 in the minute. On auscultating the chest, sonorous rhonchi were heard.

The presence of exudations, evidently diphtheritic, in the nasal fossæ, having led to the idea that possibly there were false membranes behind the veil of the palate, an attempt was made to introduce into that situation a hair pencil charged with a strong solution

of nitrate of silver. This proceeding greatly increased the excitement. It is worthy of notice that in this case, there was never any enlargement of the submaxillary glands, a fact explained by the absence of pharyngeal lesion. Another emetic was prescribed—five centigrammes (between four and five sevenths of a grain) of tartar emetic.

On the 19th of November, the child was more tranquil, and the dyspnœa was slight; but the cough was hoarse, the voice gone, the countenance livid, and the deposit in the nasal fossæ persistent. The pulse was 128, small, and thready. By the evening, there had been no vomiting; but the child had had ten green stools. The breathing had again become very oppressed, and the respirations were 46 in the minute. The child was in a state of orthopnœa. The voice was entirely gone: expiration was not, but inspiration was, noisy, and sounded as if something were impeding it: the cough was very hoarse. The nose and ears were cold: the livid hue of the countenance was increasing, and the eyes (generally closed) had a very languid expression. The poor child was constantly moving its head from side to side, as if in search of a position. But it soon fell into a state of collapse arising from asphyxia, and increased by the debility occasioned by the numerous alvine evacuations which had taken place during the day. Consciousness was unimpaired.

During the night, two violent suffocative fits occurred: next day, the asphyxia was greater than it had been in the evening. The face was pale and puffy: the lips were cold and colourless. The mind, however, seemed quite clear, the child expressing by signs that he wished to drink. He swallowed easily. Death occurred during the day, without any attempt having been made to perform tracheotomy, which from the course taken by the disease would have been useless.

At the autopsy, the respiratory passages of both lungs were found lined with false membrane from the larynx to the first ramifications of the bronchial tubes; and below that, the tubes were filled with thick mucus. In the nasal fossæ, were found the exudative products which had been seen during life: but neither in the pharynx nor mouth was there anything which could correctly be called false membrane.

In conclusion, to repeat what I have just been saying—and the point is of sufficient importance to justify my recurring to it—although the expulsion of the false membranes may in a few cases

lead to the spontaneous cure of croup, it is certain that when the disease has followed its usual downward course, the chances of a successful result from tracheotomy is much less when membranous tubes have been expelled, inasmuch as that is evidence of the disease having extended to the ramifications of the bronchial tubes. This extension of the disease sometimes proceeds very far, and I have seen cases in which children have, after tracheotomy, brought up false membrane moulded in the very minute bronchial ramifications. I still have in my museum one of these arborisations of false membranes, which I have shown you, and which was obtained under your own observation at the autopsy of a little girl who died in our St. Bernard's ward. This diphtheritic arborisation comprising the trachea and the large tubes, extended to the fourth ramifications. I met with a similar case, in a child of five years of age, who was cured by tracheotomy. The false membrane was expelled at the time of the operation.

It must be stated that generally, in two thirds of the cases according to the statistics collected by Bretonneau, as well as according to those of Dr. Hussenot,[1] the false membranes do not extend below the trachea. This is a remarkable fact, and, as I shall afterwards have to remind you, has a bearing favourable to resorting to tracheotomy in this disease. It appears, however, that in some epidemics, the extension of the membranous formations to the bronchial tubes is more usual and more rapid than in the epidemics which have come under my observation.

Dr. Peter, who had an opportunity of studying a severe epidemic of diphtheria at the Children's Hospital, in discussing my opinions on this subject, thus expresses himself :—

"Dr. Trousseau describes with care the different localisations of diphtheria : nevertheless, my own observations justify me in believing that bronchial diphtheria is more frequent than the clinical professor supposes, for I have noted it as occurring in nearly half the cases—54 times in 121 cases. I can also affirm that diphtheria extends with incredible rapidity to the bronchial tubes, a fact, till now, far from being known. In four days, a considerable surface of the bronchial mucous membrane may be coated with false membrane; and it is generally between the second and fourth days inclusive, that the bronchial tubes are invaded, if they are to be invaded at all. We

[1] Hussenot :—Thèse Inaugurale, soutenue en 1830.

must not, however, attach undue importance to the gravity of this prognostic, nor regard bronchitic diphtheria as an absolute contra-indication to tracheotomy: indeed, on the one hand, it is impossible —from the frequency and rapid development of bronchitic diphtheria —to be certain that an asphyxiated croup patient does not present that complication; and on the other hand, we know of more than one case of recovery in which false membranes, manifestly moulded in the bronchial tubes, were ejected through the canula."[1]

Let me now, Gentlemen, say a word on the general symptoms and complications of the disease. At first, as I have already said, there is *febrile excitement*. There is also *engorgement of the glands*, more considerable than in some other kinds of sore throat, but less than in the sore throat of scarlatina, or in malignant diphtheritic sore throat. The fever continues for one or two days, and then ceases, whilst the malady progresses. The *pain in the throat* is so insignificant that children of four or five years of age who are able to express what they feel, make no complaint of it. This almost complete absence of constitutional symptoms and pain in the throat allows the malady so insidiously to make way, that the physician is not called in till it has reached the larynx, that is to say, not till croup has declared itself. By this time, the pseudo-membranous formations which at first occupied the pharynx have had time to become detached, and there may then be hardly any, or not even a shred of them remaining on the tonsils, or on any part of the mucous membrane of the palate. This fact is important: it quite explains the cases in which pseudo-membranous laryngitis was supposed to have been developed all at once, and not to have been propagated downwards from the pharynx.

We have now, Gentlemen, come to the point at which it is necessary to speak of *sudden croup*: the subject is one which has a good claim on us to stop to consider it. You will hear it said by men, recognised as possessing experience, that they have often seen death from croup in children in whom the pharynx had not been implicated. Prior to Bretonneau reading his first work on diphtheria to the Academy in 1818, before the publication of his treatise in 1826, the occurrence of sudden croup was generally believed: the belief

[1] Peter (Michel): Des Lésions Bronchiques et Pulmonaires; et particulièrement de la Bronchite Pseudo-membraneuse dans le Croup. [*Gazette Hebdomadaire*, 1863.]

was that membranous croup begun in the larynx. Bretonneau, however, maintained and demonstrated that almost always—at least 19 times in 20—the pharynx is the starting-point of the malady. His friend Guersant, for many years physician to the Children's Hospital, after having maintained the first opinion, took the same view of the matter as Bretonneau as soon as his attention was awakened to the question. Since that time, every one, at Paris or elsewhere, who has taken the trouble to examine the subject has come to the same conclusion. I have seen perhaps more of croup than the busiest physicians of the capital, from the circumstance of my having been for eighteen years entrusted with the department for sick children in the hospitals, also because, from my having introduced tracheotomy into the treatment of laryngeal diphtheria, I have frequently had the honour of being consulted as to the advisability of that operation; and I declare to you that the proposition of my venerated master is the truth, that in most cases croup begins in the pharynx.

But I do not deny that there is such a thing as a sudden attack of croup [*le croup d'emblée*]. Not only do I believe that the pellicular disease may strike its first blow at the larynx, but I even admit that it may make its first attack upon the bronchial tubes. Examples of this have been mentioned by Guersant and many others. Dr. Yvaren, in his report on the epidemic of diphtheria which prevailed at Avignon in 1858, states that its special character was the sudden manner in which the larynx and bronchial tubes were attacked. I have already mentioned two cases to you in which the disease appeared simultaneously in the bronchial tubes, and trachea, as well as in parts accessible to sight. Why should it be looked on as surprising, that diphtheria should all at once localise itself in the mucous membrane of the larynx, in the same way that it localises itself in the mucous membrane of the nose, mouth, or vagina? I do not deny, then, that croup may begin in the larynx, but I maintain that its doing so is a rare and exceptional occurrence.

The former belief in the greater prevalence of this occurrence arose from the insufficient manner in which patients were examined. The throat was not explored with necessary care, and again, as the medical man was called in late, there had been time for the pharyngeal false membranes to disappear: the late arrival of the physician arising, as I have already said, from the mildness of the general and local precursory symptoms. When you are sent for to a child who

you are told has been ill from croup for only two days, get the relations to recall the preceding circumstances, and you will learn that the child had been suffering for a longer period: you will learn that for five or six days, he had been eating less, had been complaining of a little difficulty in swallowing, and had been refusing to take any kind of food which was at all hard, such as the crust of bread, and you will learn also, that there had been observed a little swelling of the neck: these are symptoms of sore throat, and of the prior existence of false membranes which you have come too late to see.

To return to the general symptoms:—In practice, when you have to do with the diseases of childhood, let me counsel you to be on your guard if there are symptoms present which, though slight in appearance, may in reality be the commencement of a terrible malady. When you see a child which has been suffering for some days from feelings of general discomfort, and an insignificant amount of fever, but is unable to tell you whence its sufferings proceed, at once examine the state of the throat, depress the tongue in such a way as to enable you to see to the bottom of the pharynx, and in many cases you will find that the discomfort has been the announcement of diphtheria, and that there is a deposit of false membrane on the tonsils and veil of the palate.

In the adult, matters pursue a similar course. The general discomfort and the febrile excitement are so slight as to be hardly recognisable, and there is almost an absence of sore throat: you will sometimes meet with patients having the pharynx coated with false membrane, and who nevertheless make but very slight complaint of difficulty of swallowing. Here, however, the danger is greater than in the child. As the adult has the laryngeal orifice proportionally larger than the child, and the calibre of the trachea also proportionally greater, the air finds sufficient passage even when the walls of these conduits begin to be covered with false membrane; and by the time that the symptoms of croup declare themselves, the diphtheria has had time seriously to compromise the ramifications of the bronchial tubes.

It is long since these phenomena made an impression on my mind, for I had a good opportunity of examining them in the epidemic of Sologne, which, in 1828, I was sent to study with Dr. Ramon. Allow me to bring under your notice some of the cases which then came under my personal observation.

Upon a certain day—a day too memorable for me ever to forget—I was dining with M. de Bethune, whose castle is situated a short distance from Selles, in the department of Cher, when a peasant came for me in urgent haste, declaring that his wife was in a state of suffocation. I immediately went to the patient. I found a woman of 28 years of age dressed in holiday attire: it was Whit-Sunday. She had attended mass in the morning at a distance of a quarter of a league from her home where she then was: she walked home, dined as usual, and was preparing to go to vespers, when she was suddenly seized with a fit of suffocation, so violent that her husband was afraid that before I arrived she would be dead. When I saw her, the unfortunate woman was in reality dying. Upon at once examining the throat, I discovered that the pharynx was covered with thick false membrane. The nature of the disease was thus demonstrated; and as the poor woman was in the last extremity, nothing but tracheotomy could prevent immediate death. Without any delay, I proceeded to perform the operation: I was alone, with the patient's husband as my only assistant; and a convex-bladed penknife, which I fortunately had in my pocket was my only instrument: having no tracheal canula, I was obliged to hammer a rough sort of one out of a ball of lead. Unhappily the false membrane had penetrated to the minute bronchial ramifications. Next day, the patient died.

The suddenness of the disaster which occurred in this case gives you an idea of the slightness of the constitutional symptoms by which it had been preceded. The case corroborates my remark to the effect, that in pharyngeal diphtheria—a disease which when it remains confined to the pharynx is a not very serious local disease—there is generally very little constitutional disturbance during the first days of the malady.

In a village in the department of the Indre, where the disease was epidemic, the rural watchman, a man aged 71, was still going about his ordinary occupations when I saw him under an attack of membranous sore throat which carried him off next day after frightful suffocative fits.

In the same *commune*, there was pointed out to me a family, several of the members of which had sunk under the disease. I was called to a little girl who was attacked by it. When I arrived at her residence, she was absent, and had to be sought for in the fields, where she was taking charge of the turkeys. I waited an hour for

her: when she came in, she was panting and could hardly breathe. In the evening, she died of croup. Although this poor child had made no change in her usual mode of life, she had nevertheless been ill for eight days, though certainly without any marked general symptoms of illness. Like the woman who died in her holiday attire, and the rural watchman who was going about his usual occupations till the day before his death, she had continued to eat, drink, and go out as usual.

Do not forget these cases, Gentlemen: do not forget that diphtheria very often sets in mildly. If there be any fever during the first twenty-four hours or first two days, it soon ceases, or becomes insignificant. The existence of the malady is hardly announced by a slight difficulty in swallowing. The difficulty of breathing comes later: but by the time it has come, the disease has reached the larynx, and will ere long, a little sooner or a little later, suffocate the patient.

In so terrible a disease, the prognosis is necessarily unfavourable in the last degree. Left to itself, it is almost inevitably fatal. Here are two examples of recovery!

During the same Sologne epidemic of which I have been speaking, the prefect of the department of Loir-et-Cher informed me that a malignant sore throat was desolating the neighbouring *communes* of Ferté-Bauharnais. I proceeded thither, and at two farms in the *commune* of Tremblevif (the farms of Roi David and Grand-Pied-Blain), I saw a spectacle as heart-rending as it is possible to witness. At the one farm I only found remaining the head of the family and a servant-girl of sixteen years of age. The man was sitting in the chimney-corner, and did not rise even to receive me. His age was 27. He informed me that he and the maid-servant were the sole survivors of eighteen residents in his house and on his farm. The maid also had been ill: but had been cured by the priest of Tremblevif, who had eight or ten times touched her throat with the spirit of salt (hydrochloric acid). As for himself, he knew, he said, the fate in store for him. "To-morrow, or next day," said he, "I shall die as my children, my wife, my father, and my mother have died." Firmly convinced that such was to be his fate, he would take no measures to avert it. I, however, examined his throat: the tonsils were completely covered with pseudo-membranous exudation: the state of the respiration and voice showed me that the larynx was not yet invaded. I endeavoured to inspire him with hope, and appealing to

the recovery of his servant, I said that all was not lost, and that if he consented to be treated in the same manner that she had been treated, he too might be cured. He yielded to my persuasion: and—God helping—my treatment had the hoped-for result. This man was saved.

Such, Gentlemen, is the appalling mortality which diphtheria brings in its train. Of eighteen individuals, two only escaped death, and these two owed their preservation to energetic treatment.

Three years previously, in another department, epidemic diphtheria made such ravages in one of the villages in the environs of Chapelle-Véronge, near Ferté-Gaucher, that of sixty children, nearly all males, sixty died! This fact is stated by Dr. Ferrand.[1]

When I arrived in Sologne, I found the medical men discouraged to such a degree that some of them were unwilling to visit any more patients suffering from malignant sore throat; and the clergy assured me that all who took the disease inevitably died of it. At Marcilly, in Villette, of 650 inhabitants, 66 persons—more than a tenth of the entire population—died of *white sore throat*, as the parish priest had designated the disease. At a later period, it is true, some recoveries took place, after the adoption of an empirical treatment recommended by a woman of the place. It consisted in the employment of a mixture of vinegar and alum, such as is used in the country in the treatment of the chancrous mouth and throat of sheep and pigs.

Pharyngeal diphtheria, then, is almost always mortal, when its progress is not arrested in time by treatment. There are forms of the malady which nearly always prove fatal whatever treatment is adopted; but the form now under consideration is for the most part curable, when recourse is had to the therapeutic means of which I am going to speak.

Apart from paralytic affections, consecutive complications of diphtheria, to which I propose specially to devote a lecture, there are other complications which increase the danger of the case, and blast the hopes of the physician, at the very moment of his counting on a cure from his having succeeded in arresting the progress of the disease by energetic treatment. I refer to *enteritis* which is common in children; to *pneumonia*, to which Ghisi has called attention; and

[1] Ferrand: Thèse Inaugurale sur l'Angine Membraneuse. Paris, 1827.

to *interlobular emphysema of the lungs* produced by the rupture of vesicles in coughing.

The child to whom I have already several times referred, gave us an example of the peripneumonic complication, which we have often met with in other circumstances. Latterly, at the autopsy of another child, we found pulmonary emphysema.

The little patient was admitted to the hospital when in the last stage of croup. He seemed dying when the *interne* on duty performed tracheotomy. At the visit next morning, fifteen hours after the operation, the child had still considerable oppression. We hastened to clear out the internal canula which had become stopped up. The dyspnœa, however, still continued; and we heard during expiration a peculiar sound caused by the passage of air through the instrument, a sound which I have called serratic—*stridor serraticus* —from the resemblance it bears to the noise caused by a saw—*serra* —cutting stone. This sound is a very valuable sign in forming a prognosis: when I hear it in children in whom tracheotomy has been performed, I consider death as inevitable. And so it was in the case of our little patient: he died during the day.

On examining the body after death, we saw the larynx and trachea coated with false membrane, which also extended into the bronchi and their very remote ramifications: several lobules of lung were separated by large bullæ of cellular tissue distended with air, which having broken up the vesicles had thus caused interlobular *emphysema*.

Bretonneau observed this lesion in two cases which are reported in his treatise on diphtheria: one of the subjects was a soldier of the legion of La Vendée, and the other a young child. The case of the latter occurred during an epidemic in La Ferrière: the emphysema was the result of the violence of the inspiratory efforts, just as in whooping-cough, it is the result of the violence and frequency of the paroxysms. In children upon whom the operation of tracheotomy has been performed, you will sometimes see this emphysema in so formidable a degree as to have reached the cellular tissue of the neck, shoulders, and chest: but it is not the consequence of the operation, as some might imagine, for it existed prior to the operation.

Dr. Peter has always met with pulmonary emphysema in the autopsies which he has made of patients who have died of croup. In the majority of his cases, the emphysema was not vesicular: in the

cases in which the suffocative attacks had been very violent, interlobular emphysema was found. Finally, Drs. Barthez and Rilliet, and also Dr. Henri Roger, have described the occurrence of general emphysema proceeding from the successive invasion of the mediastinal and subcutaneous cellular tissue. In a large majority of cases, the emphysema occupies the upper third and edges of both lungs; and Dr. Peter says that some observers have failed to see the emphysema, because in place of there being an anæmic and pale condition of the tissue, as is usual in this lesion, there is sometimes congestion and redness of the emphysematous parenchyma.[1]

Malignant Diphtheria.

A much more Terrible Form of the Disease.—The Local Affection is as Nothing compared to the Constitutional Symptoms.—It Kills, not like Croup by asphyxiating the patients by suffocative paroxysms, but it Kills by General Poisoning after the manner of Septic Diseases.—Glandular Engorgement considerable.—Erysipelatous Redness.—Membranous Coryza and Nasal Diphtheria.—Diphtheritic Ophthalmia.—Epistaxis.—Hæmorrhages of Every Kind.—Anæmia.

Gentlemen:—In my last lecture I spoke of that form of diphtheria which may be called normal, of that form of disease, which, beginning in the pharynx, extends to the larynx, trachea, and bronchial tubes, so constituting croup, which proves fatal by causing asphyxia. That I told you is the most common form: it is the form which it takes when sporadic, and also that which it exclusively assumes in some epidemics: it is even the most common form when malignant diphtheria, of which I am now going to speak, prevails. For instance, in a family in which four, five, or six individuals are attacked, croup will be the general rule, and the malignant form, which carries off persons by general poisoning, will be the exception.

During recent years, we have had several cases of the malignant form; and among others, that of a little girl, in whom you have had

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[1] Peter (Michel):—Des Lésions Bronchiques et Pulmonaires dans le Croup. Paris, 1863.

an opportunity of following the progress of the malady step by step to its fatal issue.

The patient was a girl, aged 12, who had on the evening of the preceding day been admitted into the Hôtel Dieu, under the care of my colleague Dr. Jobert (of Lamballe), who sent her to me. Only three or four days had elapsed since she had been seized with sore throat of so slight a character, and accompanied by so little fever, that neither did she make any complaint on the subject, nor were her relations in any anxiety about her state. The malady, however, having increased in severity, and the glands of the neck having become obviously swollen, she was taken to the hospital, and placed, in the first instance, in the surgical department; but when the nature of the disease was perceived, she was transferred to our St. Bernard's ward.

When examining the mouth, at my first visit, I was struck with the horribly gangrenous fœtor of the breath. The veil of the palate was thrust very much forward and to the right, exactly as in inflammatory sore throat when only one side is affected; but I saw on the veil of the palate a whitish membranous exudation, the extent of which was sharply defined, and which was attached at its upper part in festoon form, near the palatine arch. This diphtheritic membrane which reached to the pillar of the veil of the palate, became merged in a sort of greyish putrilaginous magma occupying the throat, exuding a greyish sanious fluid of the most disgusting odour. Upon the uvula, pushed completely to the left by swelling of the affected parts, I saw on the right, a covering of whitish deposit, while the left side, as well as the corresponding tonsil were free: on the posterior part of the pharynx, we perceived one or two spots of a yellowish white colour. The nostrils were in a perfectly healthy state. The swelling of the lymphatic glands at the angle of the jaw, and of the submaxillary glands was considerable on the right side, and there was a great deal of pain in the swollen parts: on the left side, nothing note-worthy was observed.

I at once came to the conclusion that I had to do with a case of malignant pharyngeal diphtheria, one of the most terrible of diseases, a disease which never spares when the physician has failed to employ energetic treatment, and is even then implacable in a very great number of cases. My prognosis, therefore, was unfavourable. Although the nose was not yet implicated—in which case I should have looked on a fatal issue as inevitable—the great engorge-

ment of the cervical and submaxillary glands seemed of very evil augury.

I immediately instituted the only treatment which could afford a chance of success. I vigorously cauterised the affected parts with a solution of nitrate of silver, composed of one part of the nitrate to five times its weight of water, and then insufflated powdered alum by means of a tube. That evening and next morning, the cauterizations were repeated, a saturated solution of sulphate of copper being used in place of the nitrate of silver. Six or eight times during the day, in the interval between the cauterizations, powdered alum and tannin were alternately insufflated. I also used all possible means for securing the regular administration of nutriment to the child, so as to make her take, willingly or by force, soup and chocolate, as well as small cups of coffee as a stimulant and tonic. I at the same time prescribed cinchona in different forms. When I return to the subject of treatment, I shall tell you how much importance I attach to the regular administration of nourishment, and why I do so.

When the patient had been four days in our wards, her situation was far from ameliorated. The glandular engorgement which had caused me from the first to form an unfavourable prognosis, had increased, and involved the cellular tissue of the cervical and submaxillary regions. Moreover, a symptom still more alarming had supervened—an erysipelatous redness of the skin, as if there was a deep-seated abscess. This erysipelatous redness, a phenomenon to which Borsieri called attention, is met with, as a general rule, only in the very worst form of diphtheria. I shall have to revert to this subject.

From the third day, we observed that the nostrils were involved. We had noticed, on the evening of the second day, that their lower parts were red: this redness increased, and next morning, there was a profuse discharge from the surface of the pituitary membrane, a pseudo-membranous secretion with which a little blood was mingled. The malady had extended to the nasal fossæ. This is a most unpropitious occurrence, as I shall have to tell you when I come to speak of the course and prognosis of this form of diphtheria; the cases in which it happens almost invariably prove fatal, if not in the acute, in a later stage of the disease.

Nevertheless, in the case now before us, the cauterizations were performed night and morning with rigorous exactitude: also, several times in the twenty-four hours, the insufflations with alum and tannin

were repeated. The child was fed in accordance with my prescription.

About the fourth day, that is, about the seventh day of the malady, the appearance of the throat was satisfactory. The mucous membrane had become almost quite free from the exudation with which it had been covered: the uvula, too, was quite free: and so likewise, very nearly, were the tonsils and lower part of the pharynx. But during the day-time of the third day, there were very profuse attacks of epistaxis, which increased the already formed unfavourable prognosis, founded on the glandular engorgement and nasal diphtheria. The child was very pale, and in an exceedingly prostrate state. The first bleeding at the nose occurred immediately after the use of an injection of sulphate of copper, but the injections were nevertheless continued. After each injection, there was a considerable mucous discharge from the nostrils; and on two such occasions, unquestionable pseudo-membranous deposit was thrown off, and this in one instance retained the shape of the turbinated bone on which it had been moulded.

The formidable symptoms, although the pharyngeal affection was cured, and although I had no reason to dread an extension of the disease to the larynx (respiration being quite normal), led me to foresee a fatal termination: I stated to you that the child would by degrees fall into a state of prostration from which nothing could restore her, that very soon we should see her refuse every kind of food and drink, and that at last she would fall into a condition of syncope and expire.

The event only too completely justified my prediction. The little patient grew cold, like a cholera patient: she had a tendency to lipothymia: her pulse was exceedingly weak and slow, but her breathing was free: we tried in vain to get her to swallow something and to overcome her utter loathing of food. Although there was perceptible diminution of the glandular enlargement; although the state of the nose was better, inasmuch as there was no longer any secretion of the fœtid ichorous discharge; although the erysipelatous redness had disappeared; although, looking only to the local manifestations, amendment had taken place, that amendment was deceitful, and the child died poisoned by the diphtheritic poison. In the act of refusing to drink, and in turning away from the nursing sister, she fainted, and died without coming out of the faint. This manner of dying is frequent in malignant diphtheria.

At the autopsy, we found no trace of pseudo-membranous deposit on the mucous membrane of the pharynx. Under the influence of the topical treatment, complete detersion had taken place, the pillars of the veil of the palate, which had been covered with a putrilaginous detritus resembling gangrene, being perfectly free from morbid matter: the tonsil was again occupying its usual place, and presented neither gangrenous nor other lesion. This case corroborates a statement I made in my last lecture, to the effect that diphtheria frequently simulates gangrene.

The case which I have now related is a case of *slow* malignant diphtheria: you have seen the *swift* form in another child which died, about three weeks ago, in the same ward. I shall lay before you accounts of other similar cases.

One of my much lamented hospital colleagues, whose name is known to all of you, and whose works many of you possess, Valleix, was in attendance upon a little girl suffering from membranous sore throat. She recovered from this affection, which was not of a severe character, under energetic treatment adopted by my unfortunate colleague. One day, when examining the throat, he received into his mouth a small quantity of saliva spurted out, in coughing, by the patient: he got the disease. Next day, on one of his tonsils, there was a small pellicular deposit: he had slight fever; and some hours later, both tonsils, and the uvula were covered with false membrane. Soon afterwards, there was a profuse discharge of serous secretion from the nose: the cervical glands and cellular tissue of the neck and inframaxillary region were a good deal swollen: delirium supervened, and in forty-eight hours, Valleix died, without having had any laryngeal symptoms.

Very recently, one of my provincial colleagues had a case of diphtheria and croup, in which he was obliged to resort to tracheotomy. During the operation, a fear of suffocation arose from blood getting into the trachea, whereupon, in dismay, my imprudent colleague applied his mouth to the wound in the neck, to suck out the blood from the air passage: he inoculated himself with the disease. Like Valleix, he died in forty-eight hours of malignant sore throat, the symptoms, including the delirium, having been similar.

To these lamentable histories, I have yet to add others equally sad. Under very similar circumstances, my friend and colleague, Dr. Blache, had the sorrow to lose his son, one of the most distin-

guished of our hospital *internes*, a youth of great promise in whom the charms of intellect were united with the most solid information. Henri Blache was put, by his uncle, Dr. Paul Guersant, in charge of a child suffering from croup, on whom tracheotomy had been performed. He passed three nights with the child. At the end of the third night, he felt slight pain in the neck, and went home to mention it to his father. Dr. Henri Roger, Dr. Legroux, and I were immediately sent for: we found the unfortunate young man in a very feverish state, and his tonsils covered with false membrane. Within a few hours, the swelling in the neck became enormous, an incessant discharge from the nose was established: delirium set in at the end of the first day: and after an illness of seventy hours, our patient died without having had the slightest affection of the larynx.

Thus, Gentlemen, you see that a special form of diphtheria may be contracted by contact with an individual suffering from the ordinary form of diphtheria, just as confluent small-pox may be taken by contact with one who has the distinct form of the disease. In the rapidly fatal malignant form, there seems to be a simultaneous poisoning of the whole system: when the characteristic pellicle begins to appear on the tonsils and in the nasal fossæ, the whole economy is already profoundly altered. Fortunately, the rapidly fatal is the most unusual form of the disease, though in some epidemics it is too common. From 1822 to 1844, I had not a single case of it, whereas, within the last few years, I have met with more than twenty examples in Paris. In two families, to which I was called to cases of ordinary diphtheritic sore throat, I saw several patients carried off by the malignant, implacable form of the malady.

Four years ago, in one of the most illustrious houses of France, five persons were attacked by diphtheria: two of the five had the disease in its ordinary form, while the other three—a mother and her two children—were carried off by the malignant, and rapidly fatal form. You will find histories of a considerable number of cases of this description in the reports of the epidemics of malignant sore throat which have scourged France in recent years; and particularly in Dr. Perrochaud's account of the epidemic which ravaged Boulogne-sur-mer from January 1855 to March 1857.[1]

[1] Perrochaud: Mémoires de l'Académie de Médecine, t. xxii, p. 91.

Diphtheria, like other epidemic diseases, has at one period a particular prevailing mood, and at another period is in a quite different humour: also, after having ceased to exhibit certain characters, it again assumes them, and thus undergoes diverse transformations and reproductions of type.

I ought to remark, Gentlemen, that for some years past, we have been traversing an epidemic period in which malignant diphtheria has been much more frequent than it had been previously. In point of fact, the disease which we have to deal with at present is unquestionably very different from that of which Bretonneau has given us the graphic picture, and recalls to our minds the descriptions of the malady left to us by the physicians of the seventeenth century.

Let us now study the *slow* form of malignant diphtheria, which you will have to treat more frequently than the swiftly fatal form. Though it is frightfully serious—more serious than typhus, cholera, or yellow fever—you may hope to save some patients from its grasp; but as for the form of the disease which snatched from us Valleix and Henri Blache, it pitilessly kills. An example of the slow form of diphtheria is afforded by the case of the young girl whose history I have recapitulated to you.

Pellicular deposits appear on one of the tonsils: their appearance is often in no respect different from that presented by the false membrane in ordinary diphtheritic pharyngeal sore throat, but they sometimes have a special aspect, being of a tawny yellow colour, resting on livid tissues, which are frequently œdematous. The patients complain of pain and dryness of the throat, and difficulty of swallowing: the latter symptom is sometimes complained of long before there is any plastic exudation, redness, or other visible change in any part of the pharynx.

There is a good deal of fever: though there is not always more fever than in the simple form of the disease. But in the malignant form, there is one symptom which is never absent—a symptom redolent of malignity, to adopt the expression of Mercatus—*pestiferi morbi naturam redolens*:—that symptom is *glandular engorgement*. The engorgement is considerable, and extends to the cellular tissue surrounding the lymphatic glands. This sign, from the first of frightfully important prognostic value, leads one to fear that the case is of the malignant form, and will resist all treatment.

The skin covering the swollen parts frequently assumes an erysi

pelatous redness, such as was observed in our little patient; this also is a symptom which unfavourably influences the prognosis. This redness suggests the idea of deep-seated inflammation. It is a symptom which did not escape the notice of the physicians of past times. To substantiate this statement, let me quote a sentence from Borsieri's chapter on gangrenous malignant sore throat:—"*Nec rarum est in hujus modi morbo, præsertim cum epidemice diffunditur circa collum, pectus et brachia crumperc ruborem quandam erysipelatodem, sæpe cum papulis morbillosis conjunctum aut exanthemata miliaria, papulasve rubras in summam cutem alicubi prodiri, quin imo parotides ipsas glandalasve maxillares jugularesve tumefieri ac dolere.*" You observe that in this passage, in addition to the glandular swelling and erysipelatous redness which I spoke of, mention is made of miliary and rubeolous eruptions, which perhaps bear some analogy to the scarlatiniform, erythematous, nettley, and pemphigoid eruptions, to which attention has been called by my colleague Dr. Germain Sée, and regarding which there was a discussion in the Hospital Medical Society.

I now return to the subject of glandular engorgement. It shows itself particularly at the angle of, and below, the maxilla, attacking first the side corresponding to that of the pharynx first affected, then attacking the other side, when the other side of the pharynx has become implicated. The diphtheritic exudation manifests itself more rapidly than in the common form of pseudo-membranous sore throat: it generally covers a part of the veil of the palate. You can recall, as it is of very recent occurrence, the case of the little girl who died of malignant diphtheria, and whose autopsy we made. She specially complained of great pain in the ear, particularly when she coughed. Pharyngeal diphtheria very often extends, by the Eustachian tube, into the auditory passage, and likewise at the same time, to the nose. After twenty-four, thirty-six, or forty-eight hours, the nasal fossæ are invaded. The existence of membranous deposit is a fact of momentous importance, and one to which I called your attention in the case of our little patient of St. Bernard's ward. Bear in mind the circumstances: for when this deposit makes its appearance, even in that form of the disease which sets in mildly, you will rarely see the patients recover, whether they be adults or children. There is, I repeat, no occurrence so alarming as an extension of the disease to the olfactory mucous membrane. Of twenty persons attacked with nasal diphtheria, nineteen die: whereas, in

twenty attacked with croup, some may be saved by tracheotomy, as I hope afterwards to show you.

You have still, I doubt not, in your mind's eye, the autopsy of a child who was in our wards for four or five days. He took diphtheria when in another hospital. When I saw him, he was breathing noisily, and with difficulty: a thin serosity, devoid of fetid odour, was running incessantly from his nostrils. There was high fever. My first general glance at this patient was enough to inform me of the serious character of the case, and to cause me to tell you that it was diphtheria which would terminate in death. The child, however, had still a fresh and vigorous appearance: but I saw the nasal diphtheria, and my experience had taught me its alarming import. On proceeding to examine the throat, I detected pellicular deposit on the uvula and both tonsils. A concentrated solution of sulphate of copper was applied to the mucous membrane of the throat and nose, and insufflations with tannin and alum were employed; notwithstanding this treatment, the child died. In this case, there was not the slightest implication of the larynx. On examining the body after death, we found a thick pseudo-membranous coating on the tonsils: the aryteno-epiglottidean ligaments presented traces of inflammation and recent plastic exudation, but no false membrane. No morbid change was observed in the larynx and trachea.

This child, then, did not die of croup, but of malignant diphtheria: it was, moreover, the presence of the characteristic exudations in the nasal fossæ which caused me to form the unfavourable prognosis so speedily realised by the fatal termination of the case.

In what way does nasal diphtheria declare itself? You have seen its mode of beginning in the little girl whose case has been the subject of this lecture. First of all, a redness appears at the orifice of the nostrils, analogous to the redness seen in persons suffering from coryza: there is an increase in the secretion from the pituitary mucous membrane, the patient blows his nose a little more frequently than usual, the mucus secreted is mixed with a minute quantity of blood, and there are generally at the same time attacks of epistaxis. Coryza, even slight coryza, supervening in diphtheria, is a serious occurrence, for it shows that the specific inflammation has reached the nasal fossæ. Within a space of from twenty-four to forty-eight hours, no room for doubt will remain: there will then be a profuse flow of a sanious ichor from the nostrils and into the back part of the throat. On examining the nose, by opening the nostrils with

the fingers or by means of a *speculum auris*, the mucous membrane is seen to be coated with false membrane which can be traced even over the turbinated bones. Our little patient, you will remember, ejected false membrane retaining the form moulded on one of these bones.

There is also observable at the same time lachrymation, an almost never-failing symptom, lachrymation resembling that of persons suffering from lachrymal tumours or obliteration of the nasal duct: it proceeds from a similar cause, for the nasal duct and lachrymal passages are obstructed by tumefaction of their internal mucous lining. In some cases, the diphtheritic inflammation, and even the false membranes, extend from the nose to the eyes. Indeed, on turning over the eyelids, it is not unusual to find, particularly on the lower eyelid, the conjunctiva inflamed and covered with pseudo-membranous secretion, the specific inflammation having been propagated to it, through the nasal passages, in succession from the pharynx and nasal fossæ. This lesion of the palpebral conjunctiva is so common that we every year meet with examples at the Children's Hospital, particularly in the malignant form of the disease now under consideration.

The symptoms of nasal diphtheria and of *ophthalmic diphtheria* are apparently so much less alarming than those of croup, that unless the physician has had sad experience of their ominous character, he will not despair of recovery when he sees them. If he looks only to general symptoms, to the moderate character of the fever, and the absence of delirium, he will not consider the debility and glandular engorgement as indicative of much danger: he will fancy that when once the nasal and pharyngeal membranous exudations have disappeared, there will remain nothing to fear. It must be admitted, however, that notwithstanding their essentially dangerous and almost always fatal character, recoveries do sometimes occur in cases in which nasal pharyngeal false membranes have been present. From among the rare cases of this kind which I have met, I will now recapitulate the particulars of a case which came under your own observation.

The patient was a boy aged ten and a half, with an intelligent countenance, light hair, and lymphatic temperament. When brought to me by his mother, on 1st September, 1855, I at once detected paralysis of the veil of the palate. I was told that it had existed for three weeks, and was consecutive to an affection, which

from the description given, had evidently been buccal and nasal diphtheria.

From the beginning of the attack, the child had complained of pain in the throat, accompanied by a swelling of the glands of the neck, which had not escaped the observation of the family. The onset of the disease was abrupt, or at least the first complaint of the child was made one day on his coming home from school. He then had high fever. The symptoms continued for forty-eight hours. During that period, he ejected by the mouth and nose white skins [*peaux blanches*], which his mother compared to pieces of flesh. The symptoms now described ceased spontaneously, no treatment of any kind having been employed. But they returned after two days, and presented similar characteristics. Again the child got rid of white skins by expectoration, and on blowing the nose. With good cause the family took alarm, dreading croup, although it was not known that there were any cases of croup in the neighbourhood. The patient did not cough, and his only complaint was of considerable pain in deglutition.

The malady continued for six days: there was then a rapid convalescence and a return to former ways. But still the child had symptoms which alarmed the mother, and induced her to come to seek advice from me. The voice was snivelling, and there was an impediment to deglutition, fluids as soon as taken returning by the nose. I had, therefore, to deal with paralysis of the veil of the palate. On examining the throat, I ascertained that this pendulous membrane did not move in the smallest degree during respiration, and did not contract when I tried to excite it to action by touching it with the tip of a feather. The little patient, moreover, complained of impaired vision, stating that he had, as it were, a mist before his eyes. The pupils were completely dilated, and did not contract when subjected to strong light after darkness. Finally, it appeared to me that the gait was a little tottering; but this symptom had no great significance, because it was alleged that from the time he was a year old, feebleness had been perceived in the lower limbs. The circumstance which had most struck the family was a change in the character of the child. Till his illness, tractable and quiet, he had, after it, become impatient and difficult to manage. In other respects, the general state of health was satisfactory. The urine was pale, and became slightly turbid when treated by heat and nitric acid. I prescribed a tonic and substantial regimen. Unfortunately,

I lost sight of this case. Here then is an example of recovery, without the intervention of art, from nasal diphtheria.

Such cases, however, I repeat for the third time, are rare, exceedingly rare: they do not invalidate the general rule which I have laid down. Notwithstanding the mildness of the general symptoms, life is in serious jeopardy in persons attacked with malignant diphtheria, when there is so much glandular engorgement, and when the nasal fossæ and palpebral conjunctivæ present pseudo-membranous exudations.

Attacks of epistaxis, as I have already remarked, often precede the formation of false membrane upon the pituitary mucous membrane: the bleedings at the nose constitute the most important notice of the coming plastic exudation, and they continue to occur till it has almost quite covered the inner surface of the nostrils.

Our little patient lost nearly 100 grammes [about $3\frac{1}{2}$ fl. ounces Brit. apoth. meas.] of blood by epistaxis—a small quantity certainly, but nevertheless, as you remarked, some hours after this hæmorrhage, her face was exceedingly pale, and her skin generally had become very blanched. Epistaxis has, from the earliest times, been always regarded as one of the most serious symptoms in diphtheria. "*Malignam significationem* præbet sanguis stillans e narribus," said de Heredia, one of the authors who described the epidemics of malignant sore throat which committed ravages in Spain at the beginning of the seventeenth century: a little further on he adds: —"*Periculosissimus censetur sanguinis fluxus ex naribus aut ore.*" Malouin, a French physician, who wrote upon the gangrenous sore throats which he observed in Paris in 1746, also recognised epistaxis as a sign of great danger: he states that several children, in Picardy, who had this symptom died within nine days from its occurrence.

But, Gentlemen, epistaxis is not the only form of hæmorrhage which we meet with: we meet with subcutaneous ecchymosis, bleedings from the lungs, alimentary canal, and bladder, in fact every kind of hæmorrhage, such as we encounter in hæmorrhagic small-pox, of which I have already spoken to you. Let me quote a remarkable example from Dr. Peter's work on diphtheria.

"On August 1st, 1858," says my colleague, "I was called from the Children's Hospital, to visit Marie P—, a child, at No. 29 rue de Sèvres. For twenty-four hours she had been in high fever, and for twelve hours had suffered from severe sore throat. When I saw

the patient, I found tonsilar sore throat, and an incipient scarlatinous eruption on the skin. On the fourth day of the malady, the fever was increased two-fold, the patient was coughing, and I detected pneumonia of the right lung, an unusual complication of scarlatina. I prescribed some sulphuret of antimony, and ordered a blister to be applied to the chest."

"Next day, August 5th, there was a slight patch of false membrane on each tonsil: the fever was intense: the scarlatinous eruption was of a violet colour: the general condition of the patient presented all the characters of adynamia. I prescribed a potion containing quinine, and lemonade as a tisane. I ordered that she should have some meat broth.

"On the 7th, the blister was ulcerated, and covered with a pseudo-membranous exudation. The false membranes on the tonsils had increased in extent and thickness, and had reached the veil of the palate: they were of a greyish colour and exhaled a fœtid odour. I caused the blistered surface to be powdered with a mixture of quinine and camphor, and cauterised the back part of the throat with nitrate of silver. As an ordinary drink, I prescribed lemonade.

"On the 8th, running from the nose had begun: and I perceived a rudimentary false membrane at the orifice of the left nostril. The scarlatinous eruption was a little less violet, but there was a burning fever. The ulceration of the edges of the blistered surface was extending, and the false membrane which covered it was thicker. So far from there being any resolution of the pneumonia, there was an increase; in the lower half of the right lung, were heard a blowing sound and bronchophony.

"On the 9th, 10th, and 11th, there was a general increase in the severity of the symptoms. From the arms and thighs, a very few shreds of epidermis peeled off, and the eruption was slightly paler: but the burning fever continued, and a fœtid odour was exhaled from nose and mouth. Around the nostrils, there were excoriations. There was an acrid discharge from the nostrils, which produced excoriation of the upper lip; and one could see that the interior of the nasal fossæ was coated with false membrane. The whole of the back part of the throat was invaded by the pseudo-membranous product: deglutition was very difficult. The nose and throat continued in a fœtid state, notwithstanding the frequent use of injections.

"On the 12th, I found symptoms of incipient pneumonia on the left side: while on the right, I heard râles which almost amounted

to gurgling: there was profuse expectoration of fœtid purulent matter. A scarlatiniform eruption had reappeared. The excoriations on the upper lip were covered with diphtheritic exudation. On the neck, I saw two bullæ of pemphigus.

"By the 13th, the bullæ had become excoriated, and were covered with plastic exudation. There were numerous petechiæ and scorbutic ecchymoses on the parts which had been subjected to pressure: there occurred attacks of bleeding from the nose, and hæmorrhage from the vesicated surface. The false membrane at the back part of the throat was infiltrated with blood.

"On the 14th, some bloody sputa informed me that there was pulmonary hæmorrhage. There were also hematuria and hæmorrhage from the bowels, symptoms which I had foreseen, and which, from the previous evening, I had led the family to expect. During the day, also in accordance with my anticipations, the voice became hoarse from the invasion of the larynx with false membrane. In the evening, the voice was broken, and still more decidedly croupy.

"On the morning of the 15th August—the 15th day of the disease—the patient died, after having passed a night of great suffering."[1]

I could not, Gentlemen, place before you a more complete or a more sadly interesting case than that which I have now detailed. Granting that scarlatina played its part, the child died from a frightfully malignant diphtheria. Scarlatinous sore throat was the starting point of the diphtheritic inflammation, whence originated the pellicular affection to which death was due. Whether it was from the special character of the diphtheritic disease, or from the individual attacked being already under the dominion of a formidable and septic malady—in a word, in a condition suitable to the engendering of malignity—the diphtheria assumed its terrible form.

The great *blanching of the skin*, the anæmic appearance to which I directed your attention, could not be exclusively attributed to the loss of blood sustained by the patient; for though such losses may be relatively insignificant, or absolutely wanting, there will yet occur decoloration of the skin. In point of fact, decoloration is a constant and invariable phenomenon in the malignant form of diphtheria: it is a sign of the cachectic state into which the individual has fallen.

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[1] Peter (Michel): Quelques Recherches sur la Diphtherie: mémoire couronné par la Faculté de Médecine, 1859.

Out of that condition arise a series of symptoms against which we are quite unable to contend. There is a dislike to food, which is quite invincible, both in adults and in children. I have often tried to struggle against it: many times, with children, have I employed every sort of device, threats, and even force, to compel them to take nourishment, but all to no purpose: they resisted every means used, would take neither food nor drink, and at last died from abstinence.

The surface becomes cold. There then supervene extreme restlessness, and an anxiety of countenance painful to witness resembling that which is seen in choleraic patients; or, there is sometimes a kind of stillness which is even more alarming than the restlessness. At last, unexpectedly, the patient getting up abruptly to satisfy a call of nature or change his position, dies suddenly in a faint. This happened in the case of our little patient.

That poor little girl, Gentlemen, has afforded you a typical example of the frightful disease, a picture of the leading features of which I have now attempted to sketch. Preserve this typical case in your memory; for unfortunately, you will too often meet with others like it in the course of your practice.

Diversity of Localisation in Diphtheria.

Palpebral Diphtheria. — Cutaneous, Vulvar, Vaginal, Anal, and Preputial Diphtheria.

Gentlemen:—I have stated to you that diphtheria manifests itself on the mucous membranes, and also on the skin when denuded of its epidermis. I said that the pharynx was its favourite seat, and that thence it extended to the larynx and trachea. I described to you pseudo-membranous sore throat, that form of the disease which is most common, which produces croup, and thus may come to a fatal termination by inducing asphyxia. I also pointed out that the pellicular affection sometimes all at once takes possession of the larynx, trachea, and bronchial tubes, but that croup occurring in this sudden manner is much more uncommon than was at one time supposed. I called your attention to nasal diphtheria, and to diphtheria of the Eustachian tube. I now propose to make a review of the different situations in which we find the manifestations of diphtheria.

I have shown you, Gentlemen, how the pellicular affection advances from the nasal fossæ to the eyelids. I must in a special manner return to this point, that I may read to you a description given by Dr. M. Peter in his remarkable work from which I have already quoted:—

"At its first appearance," says this young physician, "diphtheria of the conjunctiva, in the three cases which came under my notice, resembled simple catarrhal inflammation of the mucous membrane, there being an injected and dry condition in the beginning, and then lachrymation; but after a few hours, as the case progressed, it became more like purulent ophthalmia. The eyelids became swollen, so as to cover up the globe of the eye: the skin was shining, and stretched over the cellular tissue, which was infiltrated with lactescent serosity: a sero-mucous stillicidium was soon replaced by a profuse running, which from its acrid property traced a reddish painful ridge down from the angle of the nose.

"The eyelids were very sensitive to the touch, and on proceeding to make an examination, violent cries and energetic resistance were excited. Their œdematous tension and spasm placed obstacles in the way of exploration, which it required the greatest possible efforts to overcome. If one succeeded in raising the eyelid, the conjunctiva was seen to be lined with a layer of plastic exudation between one and two millimeters in thickness: beneath the mucous membrane, there was sometimes seen a bright, bloody-looking redness: the globes of the eyes were bathed in a sero-purulent mucous secretion.

"In two of the three cases, I have seen this secretion, the acridity of which was so great that it destroyed the epidermis and excoriated the skin, *invade the cornea*, infiltrating itself between its laminæ, depriving it of transparence, and causing perforation. This, to a certain extent, physical consequence of palpebral diphtheria, caused the resemblance to purulent ophthalmia.

"Again, in two of the three cases, along with the affection of the eyelids, there was a pseudo-membranous coryza: the eyelids and the lower half of the nose, from their red and swollen condition, contrasted strongly with the rest of the face, which was of livid paleness, and sometimes had a skeleton-like thinness. In these two cases, there was seen at each side of the mesian line, on the upper lip and at the angle of the nose, the same inflamed ridge, produced by the same acrid running."

"In two of the three cases, there was pseudo-membranous sore throat. In all the three cases, the general symptoms were exceedingly severe. In two cases, there was loss of vision from the implication of the cornea. In two cases, death was the result of the general effect of the disease on the economy. In two cases, the progress of the disease was very rapid, being four days in the one and twelve days in the other: in the latter case, recovery took place. The third case, speaking relatively, was chronic: in it, after twelve days, both corneæ were quite destroyed. In none of the cases was there any affection of the air passages."[1]

Dr. Peter remarks that one might in such cases at first suppose that the disease was purulent ophthalmia, were not the diagnosis elucidated by the concomitance of plastic coryza or pseudo-membranous sore throat: but a careful examination of the eyelids will never leave any doubt as to the real nature of the local affection.

The *prognosis* is unfavourable: it is unfavourable on account of the lesion itself, which may lead to the loss of the eyes: it is unfavourable in respect of the general disease, for in Dr. Peter's three cases, the plastic ophthalmia was the manifestation of a malignant diphtheria.

The treatment adopted was cauterization with the nitrate of silver, which was applied to the affected surfaces, after they had been cleared as much as possible from the plastic exudation: the affected parts were likewise well washed with water every hour.

Let me quote another case, in which there was a different localisation of the diphtheria—a case of *vaginal diphtheria*.

A woman, aged 21, at the full term of her first pregnancy, during which her health had been excellent, was seized with labour pains on the night of Friday 18th and Saturday 19th November, 1859. The first stage of labour was slow, the uterine contractions not being strong; and the second stage was still slower: from three to seven o'clock in the evening of Saturday, not the least progress was made. Dr. Campbell, who was in attendance upon the patient, then resolved to deliver by the forceps. The operation, performed while the patient was in a state of complete anæsthesia from chloroform, was long and difficult. After twenty minutes of arduous manœuvring, a large and well-formed male infant was extracted. It had slight excoria-

[1] Peter (Michel) Quelques Recherches sur La Diphthérie, 1859.

tions on the face and head, the result of bruising with the blades of the forceps. One of the contusions implicated one of the seventh pair of nerves, as was indicated by paralysis of the left side of the face preventing the infant from taking the breast.

The mother, however, seemed to rally from the fatigues of labour, and the next day felt herself to be going on well. On the morning of Monday, she was seized with pains in the left groin, shooting into the lumbar region and down the thigh. Drs. Campbell and Blondeau who saw the patient some hours afterwards detected incipient peritonitis, characterised by pain, increased by pressure, in the left iliac fossa. There was no swelling of the genital parts. In the evening, the pain was more acute, there was a good deal of fever, heat of skin, and the pulse was above 100. The mind was not affected. There had been neither vomiting nor nausea. The abdomen was smeared with a combination of the extract of belladonna and opium, in the proportion of three of the former to one of the latter; and it was also covered with large poultices of lint seed meal. On the Tuesday, the condition of the patient seemed to be worse: the pain in the left iliac fossa continued, and in the right, there was also pain though in a less degree. There was a good deal of fever. Ten leeches were applied over the iliac fossa. In the evening, the pain had extended to the whole abdomen.

Next day, I was summoned in consultation. When I arrived, at half-past nine in the morning, the peritonitis, which was then general, had reached the peritoneal covering of the diaphragm, as was indicated by the difficulty and pain which accompanied inspiration. The patient was affected with the peritoneal form of puerperal fever, of which there were at that time numerous cases in the wards of the Hôtel-Dieu and Hospice de la Maternité. The fever was high: the skin was hot and parched: the pulse was 120. The patient had her mental faculties entire, and retained her cheerfulness. To the inexperienced eye, there was nothing in her situation to cause alarm: we, however, were in very great dismay, because we remembered having seen cases of puerperal women dying of peritonitis, in whom, at the beginning of the attack, no symptoms of any gravity had shown themselves.

We prescribed the internal use of the essential oil of turpentine, from which in similar cases we had obtained real service: the external use of the belladonna and opium was continued. Every hour she got some of the essence, care being taken to secure tolerance of the

drug by giving along with each dose a drop of laudanum, as soon as diarrhœa supervened.

On the evening of Friday—the fifth day of the disease—we perceived a decided amelioration. The abdomen was supple: there was no longer any abdominal pain, and palpitation even did not excite it. The uterus was naturally contracted, and there only remained a little pain over the broad ligament on each side, in which situation we discovered considerable swelling. The pulse had fallen to 108 from 120, and even from 130, to which it had risen on the previous day. The temperature of the skin was good. We were hoping that we had attained the beginning of convalescence, when other symptoms supervened, which carried off this poor woman in thirty-six hours.

I have said that in the first days of the attack, there was no swelling of the external genital organs. On the Wednesday morning, however, this swelling was manifest: the swollen parts were painful, but the pain was calmed by the application of poultices of lint seed meal. This affection, sufficiently accounted for by the bruising in the obstetrical manipulations, presented nothing visible which was worthy of notice, excepting a slight excoriation of the labia, where a tear had been made by the forceps: this tear was about half a centimeter in length. On the Thursday, however, the sixth day after delivery, on examining the parts, and on using the catheter, it was found that there was a large blackish-grey patch on the left side of the vagina: around this patch, the mucous membrane was of a dull red colour, and presented plastic exudation, which I detached with the handle of a spoon. *Vaginal diphtheria* was thus only too evidently characterised. The part was at once energetically cauterized with a saturated solution of sulphate of copper; and an ointment strongly charged with tannin was then applied to the affected parts. Under the use of these means, which were repeated several times in the twenty-four hours, the progress of the malady seemed to be arrested: at all events, on the Friday evening, when I examined the parts, and detached the sloughs which I had produced, I perceived that the subjacent mucous membrane was of a beautiful bright red colour, and that no more diphtheritic patches were visible.

The peritonitis was proceeding in a fair way to resolution: we believed ourselves to be masters of the diphtheritic affection, the terrible complication which had but a short time before deprived us of every ray of hope: we were in fact thoroughly pleased with the aspect of the case, when (about three hours after my visit) the con-

dition of the patient became very much disturbed. Her pupils were dilated: she complained of pain in the throat, and difficulty in deglutition. As there was no fever, and as on attentively examining the pharynx, neither redness nor trace of plastic exudation could be discovered, Dr. Blondeau attributed the symptoms to the action of the belladonna, of which there was still a thick coat on the surface of the abdomen. He carefully washed the skin of the abdomen; and for some hours afterwards the young woman's state seemed more favorable. But during the night—about three in the morning—more formidable symptoms appeared. The patient awoke from a slumber in a very agitated state, and tormented by disagreeable visions. Her haggard countenance expressed the most intense anxiety: her pupils were very much dilated: there was considerable dryness and pain of throat: the pulse was 140. Upon again carefully examining the pharynx, there was absolutely nothing noteworthy to be seen. All the symptoms were put down to the account of the belladonna; and to subdue them, strong coffee was prescribed.

Next morning, there was anxiety, febrile excitement, a pulse of 130, and only a slight increase in the temperature of the skin. She had passed a sleepless night; but from the beginning of her attack, she had suffered from insomnia. The peculiar expression of the countenance, and the drawn features, proclaimed a great change: the pupils were dilated, and the breathing was laboured: everything indicated excessive disturbance of the system. In the evening, the symptoms of malignity were still more decided. Next morning, we came to the conclusion that this unfortunate young woman was under the influence of malignant diphtheria, and that the uterus was the centre of the mischief. In about six hours, our worst fears, at least as to the nature of the disease, were only too well confirmed, for at midday, we saw, behind the right pillar of the veil of the palate, a characteristic exudation of a tawny yellow colour of the size of the nail of the little finger. No time was lost in vigorously cauterising the affected spot, and stripping off its covering of false membrane. Unfortunately, it was trouble lost, as we found ourselves confronted by that malignant form of diphtheria regarding which I am now lecturing—that form of diphtheria in which local manifestations go for little as compared to the general symptoms, and in which topical treatment is of exceedingly little use. At six o'clock, three hours after the appearance of the pharyngeal false membrane,

the corresponding side of the uvula was implicated: some hours later, the entire veil of the palate was involved, and covered with a livid yellow exudation lying on the mucous membrane, which was œdematous and of a dull red colour. The urine was found to contain a considerable quantity of albumen. About two o'clock in the morning, the patient felt that her end was approaching. She spoke to her family with great composure, and died quietly, almost without a struggle, at a quarter past eight.

On the same day, her infant died of diphtheria. On the Thursday, we had observed in the infant a plastic exudation on the alvcolar margin of the upper maxilla. Cauterization with solid sulphate of copper completely modified the affected surface, and no more exudation appeared on it. But behind the left ear, on the excoriated skin, there was plastic exudation: this surface was cauterised, and it cicatrised rapidly. The excoriations produced by the forceps on the hairy scalp became in their turn affected: one of them, now a sore deep and penetrating to the right parietal bone, had a greyish coating, with edges of erysipelatous redness. The facial paralysis prevented the infant from sucking, but it took milk from a glass. It was attacked with vomiting and diarrhœa: the face became pinched, and the body wasted rapidly. On the Sunday morning, convulsions supervened, and recurred incessantly till death took place at six o'clock in the evening, being ten hours after the mother's decease.

These two cases are of such importance as to be laid before you in detail. Possibly, while the diphtheritic poisoning may have imparted to the puerperal state both in mother and child, its appalling malignity, it may also, through its terrible influence on the economy, have arrested the peritonitis, which ceased with unlooked for promptitude. It is not an unusual occurrence for a lying-in woman to be attacked with diphtheria. Sometimes, and possibly it was so in the case of our young woman, the pellicular affection invades the surface of the uterus, becoming developed on the placental wound, as occurred in numerous cases reported by Dr. Béhier.

Diphtheria of the genital organs is an affection frequently met with, especially in hospitals for children, where diphtheria is exceedingly contagious, and is, so to speak, established in permanence. In little boys, we met with excoriations of the gland and prepuce: in little girls, with excoriations of the vulva and genito-crural fold, so common a sequel of measles: in both sexes, excoriations of the anus

constitutes the door through which the disease enters—these excoriations becoming covered with plastic exudation.

In the medical expedition, which, along with Dr. Ramon, I made in 1828, in the departments of Loiret and Loir-et-Cher,[1] I visited the *commune* of Chaumont-sur-Tharonne, situated between Romorantin and the Ferté-Beauharnais, where an epidemic of malignant sore throat was very prevalent, and where several persons had already been carried off by it. The daughter of the watchman of Chaumont, servant at a farm-house some distance from the village, feeling the first symptoms of diphtheritic sore throat, ran home in dismay to her father's house in Chaumont, and died there a few days after her arrival. She occupied the same bed with her mother, aged 40, and a young sister. The day after her death, her mother experienced readful pains in the vulva and lower part of the abdomen. Her husband examined the affected parts, and it is from him that I obtained an account of them. "I looked and saw," said he, to use his own exact words, "what resembled the throats of our children, and which also had a very bad smell: in the inside it was grey and black, and round about it was red." This woman died in five days from the time she began to complain, and eight days after the death of her first daughter. Scarcely had a week elapsed ere the second daughter perished of laryngo-tracheal diphtheria.

Facts of a similar nature were observed at Mézières (Loiret). Malignant sore throat appeared in the family of the watchman of the castle, where a child six years old had died. Soon afterwards, four daughters of a man named Adam who lived in the court of the castle died of diphtheria. One of them, seven years old, had simultaneously the hands, feet and vulva invaded by pellicular inflammation similar to that which had possession of the throat: she did not die of suffocation, but sunk into a state of profound adynamia which soon terminated in death. This case was communicated to me by Dr. Carrière, physician at Cléry, to whom I am also indebted for the following history.

A man named Montigny, who had seen, within a month, six of his children die in succession of malignant sore throat, out of seven attacked, felt the first symptoms of that malady, while at the same time the prepuce became covered with false membrane.

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[1] An account of this expedition was published in the "*Archives Générales de Médecine*," for July, 1830.

Dr. l'Epine, physician to the prytaneum of La Flèche, saw a similar case during the epidemic which prevailed in that establishment. In his paper, he says:—"Mary, nursing sister in the infirmary of the school of La Flèche, had from the earliest days of her illness presented very aggravated symptoms of malignant sore throat. The disease, after having made great progress on the tonsils, appeared at the anus. The *anus*, very much swollen, painful, and of a livid red colour, was covered with a diphtheritic pellicle, which could only be detached bit by bit, and very slowly. After showing for several days decided symptoms of amendment, she fell into a state of extreme adynamia, having very frequent and protracted fits of syncope. She died on the seventeenth day of the malady."

Cutaneous diphtheria is still more common than the other forms of diphtheria which I have just been describing. It most commonly shows itself upon the surfaces to which blisters have been applied, in the folds of the skin met with in too fat children, upon chafed surfaces, upon herpetic vesicles, upon chapped breasts, upon cuts, upon excoriations of the scrotum, upon the slightest solutions of continuity, and, in a word, wherever the skin is denuded of its epidermis, and wherever there is cutaneous irritation arising spontaneously or from an injury. It supervenes in persons who have a diphtheritic affection in some part of the body, as, for example, pseudo-membranous sore throat; or, its appearance may be the first declaration of the disease in individuals who have been in contact with diphtheritic patients.

Attention was directed to cutaneous diphtheria by Chomel in 1759; and by Samuel Bard in an epidemic which he observed at New York in 1771. The following is the notice of the affection given by the American physician:—

"One of the first families," says he, "in which the malady appeared was that of Mr. William Weddle. There were seven children in the house, all of whom fell ill one after the other. The four who were first affected, the youngest of the family, had pharyngeal sore throat, and three of them died. They had no embarrassment of the respiration, but that symptom was replaced by bad ulcers behind the ears. These ulcerations commenced as distinct red patches, which soon became united. They caused intense itching, and profusely exuded an ichor, so acrid as to erode the neighbouring parts in such a way, that within a few days the erosion occupied the space behind the ear, and extended down to the neck. All the patients had fever,

partieularly at night. One suffered from eonstant tenesmus, a symptom presenl in several of those who had difficulty in breathing, but in none did it exist to so remarkable a degree as in the ease referred to. Several had ulcerations behind the ear similar to those now described; and some patients seemed to be affected with slight difficulty of breathing. The ulcerations continued during several weeks, and at various points beeame covered with a pellicle similar to that on the tonsils; and they also became very painful."

My attention was never so mueh oeeupied with this subjeet as during the medieal expedition to whieh I have referred, and regarding which I am now going to speak.

Dr. Ramon and I were informed that malignant sore throat had just broken out at Nouan-le-Fuzelier in the department of Cher-et-Loir, a village on the road from Orléans to Bourges, and that it had already destroyed victims there. We went thither; and Dr. Leménager, a physician residing in the plaee, had the goodness to go with us to the houses of the patients. Our first visit was to the house of a woman named Joséphine Pressior. It was situated at the northern extremity of Nouan; and up to that time there had been no eases exeept in the southern district, in a hamlet called Les Rois a little detached from the village. Joséphine informed us that her daughter, a girl of 18, had had some intercourse with an infeeted family in the hamlet of Les Rois; and that soon afterwards, she had been attacked by pharyngeal diphtheria. When we saw this young woman, she was in the eighth day of the malady. Dr. Leménager had applied leeches to the neek, had three times touehed the back part of the mouth with a solution of nitrate of silver, and had several times insufflated alum. He had likewise, through dread of gangrene, had a eamphorated deeoction of einehona injected into the throat, and had preseribed alum and quinine gargles. On the fifth day of the disease, a blister was applied to the nape of the neek: profuse suppuration supervened, the abraded surfaee beeame covered with false membrane, and likewise an old uleer on the foot beeame similarly eoated.

I found the child's back in the following eondition:—the blistered surfaee, whieh originally was not more than three inehes broad, was now more than six: it was horribly painful, and was suppurating profusely: it extended over the baek, making irregular deviations like the marks ealled "points" on a baekgammon board; and it was surrounded by a large erysipelatous areola, mueh more apparent

below than above or at the sides. The part denuded of epidermis seemed to be, and really was depressed, in consequence of the surrounding tumefaction. It was covered with superimposed layers of yellowish white fibrinous deposit, which was thickest in the centre, and gradually became thinner as it approached the circumference. In the middle, the thickness of the deposit was from two to four lines: it bore an exact resemblance to the dry pleuritic concretions found in the cavity of the chest when resolution has begun, and when the serous fluid which was effused has been almost entirely absorbed. On raising some of these concretions by means of a very thin leaf of metal, we saw that they adhered strongly to the cutaneous tissue, and that there was a certain amount of difficulty in detaching them. It ought to be mentioned that butter only had been used in dressing the blister.

The surrounding erysipelas had a singular aspect. The nearer to the excoriated parts, the more intense was the redness. At numerous points, the epidermis was raised up by small collections of lactescent serosity, so that the skin was covered with confluent vesicles in the neighbourhood of the wound: as the distance from the healthy skin diminished, so also diminished the number of the vesicles. Some of the vesicles seemed to be formed by the union of several: there were others which had burst, either when single or united, and in their place there was seen a white membranous exudation covering the dermis. These ulcerations became united to others of smaller size, and ultimately they all coalesced with the principal ulceration: in this way the disease advanced step by step. Let me add the mention of a fact which is remarkable, viz. that the erysipelas rarely spreads in the regions of the head and shoulders, and is indeed seldom met with in these situations.

Joséphine Pressoir, the mother, being in the fields five days before her daughter fell ill, was seized with acute pain in one of the breasts, in consequence, as she said, of catching cold. Inflammation of the mammary cellular tissue soon supervened, and an abscess formed. The pus found an exit for itself: at the most elevated part of the tumour, the skin became mortified to the extent of about three lines, and thus the abscess opened spontaneously. I saw the woman the day after this occurrence: the wound was already surrounded with an erysipelatous circle, and the edges of the ulceration were covered with a false membrane which extended over the integuments for a space of from two to three lines. The woman's daughter was at this

time in the eighth day of her diphtheria: during all her illness, she had never discontinued to sleep with her mother.

At Blettière, a farm in the *commune* of Marcilly-en-Villette, department of the Loiret, five persons died of pharyngo-tracheal diphtheria. P. A. Huré, aged ten, slept in the same room and bed with those who were carried off by the malady. Very soon, a slight inflammation which he had behind the ears became aggravated, the skin became covered with false membrane, pellicular inflammation extended over the whole back; and he died in a few days, exhausted by horrible pain and excessive suppuration. Dr. Regnaud, physician at Ferté-Saint-Aubin stated that he had seen another patient die at Marcilly in an exactly similar manner from cutaneous diphtheria, which commenced in some ulcerated pustules of porrigo favosa in the hairy scalp, whence it extended to the neck, back, and down even to the loins. He also communicated to me the history of a man of Marcilly, in whom the skin of the scrotum, previously excoriated, was the seat of a diphtheritic affection.

At Grand-Pied-Blain, a grange in the *commune* of Tremblevif, rather less than a quarter of a league south-east from Ferté-Beauharnais, twelve persons were attacked with malignant sore throat, and ten of them died. To the mother of three of the deceased children, a blister had been applied as a measure of precaution—as a means of preventing the disease! But in a few days, a frightful inflammation took possession of the blistered surface and surrounding parts: in a very short time, the unfortunate woman was dead. I was told that the skin of the neck had been attacked by gangrene.

Similar events were observed in the family of Bouzy at the hamlet Des Rois, near Nouan-le-Fuzelier. Cases had already occurred in most of the houses in the hamlet; and a little girl died of the malady in a room immediately adjoining that of Bouzy. A young man named Cauqui, aged 19, slept in the same room with Bouzy, his wife and his child. He took malignant sore throat: Bouzy, terror-struck, applied a blister to both arms of his child "to draw out the bad humours:" almost immediately, the blistered surfaces became covered with false membrane, and the surrounding skin became inflamed. On the fourth day of the malady, when I first saw this child, the nose was obstructed by pellicular exudation, there was an extremely fœtid serous discharge from the nostrils, and the diphtheria was beginning to invade the pharynx.

At Saint-Loup, department of Loir-et-Cher, of twenty-one persons attacked with diphtheria, nineteen died. An individual named Blaise, deputy of the mayor, and his wife had just left their two children: they themselves were suffering from malignant sore throat when I was taken to their house by Dr. Macaire of Menneton. The husband was already improving, thanks to the topical treatment which had been adopted; and his wife, whose larynx had been invaded by false membrane, was beginning to breathe more easily, but a blister had been put on the left arm, which was in a truly frightful state. The blistered surface was remarkably enlarged, had the appearance of being much depressed, was covered with a blackish grey pellicular exudation, and was discharging a very fœtid clear serosity. The arm, fore-arm, and hand were swollen and had a glistening rosy colour. It was very difficult to believe that the blistered surface was not the seat of mortification; but on pricking it with a pin, I found that beneath the false membrane, the surface was exceedingly sensitive. I powdered the broken cutaneous surface with sublimated calomel. Next morning, the pain and swelling had almost entirely disappeared: the same treatment was continued. Three days from the commencement of the treatment, the wound was quite cleansed, laudable pus was being secreted, and the false membrane had entirely disappeared. All that remained was a small slough which separated in twelve or fifteen days.

A boy had just died of tracheal diphtheria at a farm in the department of the Indre. Dr. Bonsargent, called in too late, was unable to afford him efficacious treatment. But he had ordered some leeches to be applied to the abdomen of the mother, who was complaining of pains in that region. The leech-bites were soon inflamed; and the skin, after becoming erysipelatous and denuded of epidermis, was speedily covered with false membrane so exceedingly fœtid as to simulate gangrene.

François Minière, aged 45, a district roadman of Chaumont-sur-Tharonne, department of Loir-et-Cher, had two children suffering from epidemic sore throat. One died: the other was cured by topical treatment. While matters were thus going on, the father who had an excoriation at the inside of the metatarso-phalangeal articulation, began to feel acute pain in that situation. The skin soon became erysipelatous and denuded of epithelium: some days later, there was a foul ulcer with thick uneven edges, surrounded by a considerable amount of swelling: its surface was covered with

greyish false membrane, which could be easily stripped off. The glands of the groin and inside of the leg were a good deal swollen. About six grains of calomel were sprinkled over the affected parts. In thirty-six hours, the ulcer had diminished one quarter in size, the pain was less acute, the swelling had disappeared, and there was no longer visible any false membrane. I discontinued personally to apply the calomel, leaving some of it for use; but the patient lost it, and the ulcerated surface which had been so speedily reduced in size, remained stationary for a long time.

A young boy of Marcilly-en-Villette, by name Denis-Lubin Maître, and likewise his mother, had had for some time diphtheria of the gums, a form of the disease regarding which I shall afterwards have to speak to you. He died of diphtheria, which simultaneously invaded the throat and hairy scalp. This boy had tinea. His brother, aged 13, a cow-herd at Colombier, *commune* of Ménestreau, came to Marcilly when his father and sister were ill: soon after his return to Colombier, ulcerations which he had on his head became horribly painful, and discharged a great quantity of fœtid serosity. I got these particulars from the boy himself, and from Madame Briolet of Cyran who attended upon him, and who cured him. This patient was the cause of the epidemic breaking out in the place where he resided. I shall recur to this history, when I make some remarks on the contagion of diphtheria.

At Paulmery, near Selles, a young girl had contracted the disease: she went home to her family at Barres (department of Indre), a farm situated a league from Paulmery, where she very soon died. Her two sisters also died. Their mother, who had attended upon them, took diphtheria, which attacked the neck and the whole of the right side of the face: she did not die, but she had a great deal of suffering and a tedious recovery.

At Graçay (Indre), an unweaned male infant was seized with diphtheritic sore throat, which was prevailing as an epidemic. Up to his death, his mother suckled him: her nipple soon became invaded by the special inflammation, and covered with false membrane, the extension of which was arrested by appropriate treatment.

At the same period, Dr. J. Bourgeois observed at Ferté-Saint-Aubin, in a family of seven persons, an epidemic of diphtheria, which affected the skin in all the seven, and in one little girl the vulva: in a boy who died of croup, the first seat of the disease was the thigh, at a point slightly excoriated by the friction caused by the

edge of a wheelbarrow in which he had been drawn by a brother, who was carried off, seven days before the former, by laryngeal diphtheria.

Since these occurrences, Gentlemen, similar facts have greatly multiplied, and there are few physicians who have not met with some such cases. You have, yourselves, observed a certain number in the clinical wards.

In a female infant of eighteen months, who occupied bed No. 18 of St. Bernard's ward, I showed you the pellicular affection behind the ears where there had been eczema. You recollect a little boy, four months old, in whom diphtheria declared itself in the front of the neck, upon red spots which had formed between the folds of the skin; it soon extended to the ears: repeated cauterizations with the perchloride of iron led to recovery. In other cases, the surfaces to which blisters had been applied were attacked: and among the cases of this description was a male child who lay in bed No. 15 of our nursery ward. He had a blister on the arm, which was the cause of his contracting the disease from a woman in our wards who lay close to his cradle, and who had plastic stomatitis.

It is hardly four years ago since I was sent for by a physician to see a child with pharyngeal diphtheria. The progress of the disease had become arrested under the influence of very energetic topical treatment; but the attending physician had thought it necessary to apply a blister to the front of the neck. I expressed to my colleague the fears which I entertained regarding the blistered surface, which I said there was every reason to expect would soon be covered with plastic exudation, which would soon probably invade the front of the chest. I advised recourse to vigorous measures. My anticipations were but too completely realized. The whole of the neck and the front of the chest became involved in diphtheritic disease; and the little patient died, not of croup, but of general diphtheritic poisoning.

Very recently, I was asked to visit a girl, ten years old, who, for some days, had had behind the ears, diphtheritic patches, developed probably on an eczematic surface. The eczema had been neglected, from, I regret to say, the singularly mistaken idea of the attending physician, that it ought not to be interfered with, its existence being, in his opinion, rather a favourable than an unfavourable circumstance. The throat, however, was in turn attacked; and when I saw the child, I found both tonsils covered with false mem-

brane, which—as well as the cutaneous deposits—I hastened energetically to cauterize. The little girl recovered.

What are the characteristics of cutaneous diphtheria? As soon as it affects a solution of continuity, pain is felt in the part: forthwith, there is a profuse discharge of fœtid, colourless serosity; and very soon the surface is covered with plastic exudation, flabby, greyish, and variable in respect of thickness. The edges become swollen, assume a violet-red hue, and appear much raised above the level of the bottom of the sore. The disease, however, does not generally extend, and may remain stationary: sometimes, however, even when only the epidermis has been removed, we see the dermis become at once covered with a white plastic exudation, similar to that observed upon surfaces to which blisters have been applied. Not unfrequently, erysipelas appears around the excoriated part. The epidermis of the erysipelatous surface is raised up at numerous points by little collections of lactescent serosity, in such a manner that the skin in the neighbourhood of the sore is covered with confluent vesicles: the vesicles gradually decrease in number with the increase in the distance between the sound skin and the sores. Some of the vesicles seem to have been formed by the union of several: and others, simple or aggregate, burst, when in their place is seen the dermis covered with a white plastic exudation: these excoriations unite with smaller ones, and thus form a junction with the principal: it is in this way that the disease accomplishes its progressive invasion. Thus it is that diphtheria, commencing in a slight excoriation of the hairy scalp, or on the skin behind the ear, may invade the skin down to the loins, as I have seen in several cases. The pellicular deposit, at first thin, becomes gradually thicker, the layer formed last on the skin constantly raising up those previously secreted, so as at last to constitute a coat of from four to six lines in thickness. The layers nearest the dermis preserve their consistence; but the more external layers, being bathed in the serous discharge, soften, putrefy, change colour, assuming a grey or sometimes blackish appearance, and exhale a dreadful fœtor. It is (as in pharyngeal diphtheria) very difficult under such circumstances, not to believe that there is extensive sphacelus.

I do not say that there are no cases in which gangrene may not attack parts affected with diphtheria: this, in fact, does occur, and particularly in diphtheria of the vulva, as I mentioned when speaking to you of the complications of measles. When the disease spreads

with rapidity, or when it simultaneously occupies a great many points, there may be high fever; but generally, there is not much fever, and what there is has a hectic or suppurative character.

The continuous mode in which the invasion of diphtheria takes place has this peculiarity, that it generally advances from above downwards. Thus, for example, we do not find diphtheria ascending the arm to the shoulder, or proceeding from the neck to the scalp; but, on the contrary, we see it descend from the shoulder to the arm, from the neck to the back, from the belly to the loins, and from the nipple to the rest of the breast. It juts out irregularly, affecting sometimes the shape of points in a backgammon table, the surrounding skin presenting a dull red colour. It is very probable that the propagation of the diphtheritic inflammation is accomplished by the irritation induced by the long contact of the serous discharge which bathes the parts as it runs downwards, or is retained by the dressings in particular situations.

But this kind of *extension* of the disease differs very much from its *repetition*, if I may be allowed so to express myself. It is enough that a point of skin or mucous surface is the seat of the pellicular affection, to cause the malady *to repeat itself* in several other places simultaneously, under the influence of any slight accidental influence. Thus, as I have already said, cutaneous diphtheria may develop itself in individuals suffering from pseudo-membranous sore throat, and likewise, diphtheria primarily developed on the skin, may become the starting point of pseudo-membranous pharyngeal and laryngeal affections.

There takes place what we see occur in syphilis. What is it that takes place in that disease? At the point of inoculation, there is produced the specific ulceration, the chancre, and at a longer or shorter interval after the sore is healed, the characteristic constitutional symptoms of pox appear. In cutaneous diphtheria, matters proceed more rapidly, but in a similar manner. An abraded surface has served as a door of admission for the disease, which for some time, remains a local affection: sometimes, it may be destroyed in its locality by energetic treatment at the opportune moment, but too frequently, notwithstanding energetic treatment, and even when we are hoping that the progress of the malady has been arrested, diphtheritic exudations appear on other parts of the body, particularly in the region of the pharynx, the favourite seat of the plastic affection, and the victim dies in a profoundly anæmic state, with the malignant

symptoms already described. Often, even, the patient sinks prior to the manifestation of any new local symptoms.

Cutaneous diphtheria, under which term I include diphtheria of the vulva, vagina, and anus, is thus, you see, a much more formidable disease than the croup-producing pharyngeal diphtheria: it is more formidable solely on account of the intensity of the inflammation, which, from its occupying a large surface, may lead to deep-seated mortification of tissues, often the starting-point of general poisoning of the system, thus constituting that malignant form of the disease to which I have directed your attention.

These facts are known, but they are not as yet sufficiently known. I am often called, and you too, Gentlemen, will often be called to children suffering from pharyngeal diphtheria, more particularly when there is croup, to whom blisters have been applied. Again, when you are in hopes that you have saved a child by tracheotomy, when the tracheal wound was nearly closed, and all seemed going well, you will have the grief to see your patient perish from malignant diphtheria, which may have had its starting-point in an injurious proceeding of the relations, or sometimes of the medical attendants.

I cannot, therefore, too often repeat to you:—Take care that you do not, for any reason whatever, apply blisters to patients suffering from croup: beware of wounds, beware of the very smallest solutions of continuity, and of leech-bites in persons attacked with diphtheria. When you do find any solutions of continuity, cauterize them vigorously without loss of time, with the solid nitrate of silver, or the solid sulphate of copper: powder them with calomel, white precipitate, or red precipitate: with all possible expedition, modify the morbid action of the affected parts, so as to prevent, as far as that may be possible, the frightful symptoms which will otherwise inevitably declare themselves.

Diphtheria of the Mouth.

[*Stomacace.—Watery Chancres.—Scorbutic Gangrene of the Gums.—"Fegarit"* of Spanish Physicians.—*Ulcero-Stomatitis: Ulcero-Membranous Stomatitis.—Diphtheria of the Gums.*—] *Of all the manifestations of Diphtheria, it has the greatest tendency to remain confined to its first Locality.—May be propagated to the*

Pharynx and Larynx and produce Croup.—May lead to Gangrene.—May be a Manifestation of Malignant Diphtheria.—Exceedingly contagious.—Epidemic.

Gentlemen:—Diphtheria of the mouth was really not known to the physicians of our day till after the publication of Bretonneau's remarkable treatise on diphtheria. In calling the attention of his contemporaries to this disease, the illustrious physician of the school of Tours remarked that it was one of the species of *stomacace* of the older authors, and of *fegarit* of the Spaniards, names, he says, which, though different in their etymology, both signify malignant ulceration of the mouth.[1] Van Swieten has devoted a special paragraph to it; but he misunderstood its nature, regarding it as a scorbutic affection. However, recalling the description which Aretæus has given of malignant ulcers of the tonsils—"tonsillarum ulcera pestifera"—Van Swieten recognises the connection which exists between the malignant aphthæ and the Syrian disease: he admits that the disease is propagated, not only to the pharynx, but also to the respiratory organs. These facts had fallen into oblivion, when they were again brought to light by Bretonneau, who showed that pseudo-membranous stomatitis, pseudo-membranous sore throat, and croup are identical.

In 1818, when the legion of La Vendée was in garrison at Tours, several soldiers were attacked by a particular affection of the gums to which the surgeons gave the name of land scurvy [*scorbut de terre*]. Within a very short time, nearly the entire legion was attacked: the number of patients was so great that some had to be removed from the surgical to the medical wards, a circumstance which afforded Bretonneau an opportunity of studying the disease. At first, he also believed that the disease was scurvy. He perceived, however, that the outbreak could not be ascribed to the influence of diet or locality, and that the condition of the patients presented no trace of scorbutic cachexia: they were strong, vigorous men in the enjoyment of perfect health, except that they had this particular affection. This scurvy had, in point of fact, stomatitis as its sole manifestation: there were no ecchymoses, no stiff joints, no hæmorrhagic tendency except bleeding from the gums: in a word, there was not found any of

[1] Van Swieten:—Chapter, "*De l'Angine gangréneuse*" commentary on Boerhaave's Aphorism, 816.

the marvellous symptoms described by authors, particularly by Lind. Bretonneau observed that some of the soldiers affected with the scorbutic gangrene took diphtheritic sore throat, and died of croup. This circumstance led him to reflect on the fact, that in other soldiers of the same legion the tonsils were primarily affected by the plastic inflammation, which extended to the back part of the throat and to the air passages: he then came to the conclusion that this so called scorbutic gangrene was nothing else than the pellicular disease occupying the gums, and wearing a particular aspect. At precisely the same period, some cases of croup occurred in the vicinity of the principal barracks occupied by the Legion of La Vendée. The physicians of the town affirmed that up to that time they had not met with a single case in the entire course of their practice; and Bretonneau himself acknowledged that he had only twice seen croup. Ere long, a real epidemic of the disease scourged the town of Tours.

Bretonneau, having examined with minute attention the numerous cases which were passing before him, very soon became convinced that the stomatitis which was then occurring was identical with the disease called gangrenous sore throat. He assigned to the disease certain characters, which I shall now endeavour to describe to you.

After experiencing general discomfort for some days, or still more frequently, without anything to announce the coming on of the symptoms, there appear on the free margins of the gums, at the insertion of the teeth, small, yellowish white, oblong, irregularly rounded patches, forming a sort of border of not more than a millimeter in breadth. The tartar round the neck of, and on the substance of the diseased teeth is deposited in greater abundance than usual as a greyish, brownish, rusty looking mud. The gums are gradually destroyed around the sockets of the teeth, in consequence of which the teeth become uncovered and loose. The rusty colour to which I have adverted is due to the mixture of a certain quantity of blood with the peculiar pseudo-membranous exudation from the gums. The slightest touch causes the affected parts to bleed, and even by gently separating the lips, you will cause little drops of blood to fall down. The gums are painful, and to a certain extent swollen, but they never present the blue fungous appearance which they have in scurvy. As the disease advances, the false membranes extend, become livid or black, seem as if deeply sunk, and are surrounded by a red border encircling them like a cushion, so that they simulate ill-

conditioned ulcers. But there is no ulceration; and the false membranes are easily detached from the mucous membrane which they cover. When, however, the false membranes are removed, they are speedily replaced by others. The lymphatic glands of the submaxillary region, which from the onset of the disease had begun to be swollen, and painful particularly when touched, now become more swollen, and embrace the neighbouring parts in the tumefaction.

A considerable flow of saliva and sanious serosity wets and stains the linen of the patient: this discharge continues during sleep. The breath exhales an intolerably fœtid odour: this fœtor, combined with the appearance of the affected parts, gives the disease a very great resemblance to gangrene. But here again, appearances are deceitful. There is here no more gangrene than there is in pharyngeal diphtheria: nevertheless, just as I was careful to tell you, that in some rare instances pseudo-membranous sore throat leads to sphacelus of subjacent tissues, so must I state, that plastic stomatitis may lead to a similar result. I must add, that this consecutive gangrene is a much more common sequel of buccal than of pharyngeal diphtheria. It is far more frequently met with in hospital than in private practice: indeed in the latter, I have never yet seen it.

There is no period of life at which diphtheria of the mouth does not occur; but it is a rare affection among young children, and exceedingly rare among infants at the breast. Bretonneau's first observations, as you are aware, were made on soldiers, consequently upon adults. It is, in general, at the socket of a diseased tooth, that diphtheria of the mouth begins, and thence it proceeds to invade the rest of the gums.

There is no form of diphtheria which has so strong a disposition as diphtheria of the mouth to localise itself without spreading to neighbouring parts. Thus, although diphtheria of the pharynx has a tendency to advance from one place to another, like lava flowing from a crater, diphtheria of the gums may remain stationary for some months. It would, however, be a mistake to believe that it never extends. Not unfrequently, the malady is communicated from the gums to the mucous membrane of the cheeks, and inside of the lips, forming a junction with the white spots, which then soon increase in size. Afterwards, in their turn, the veil of the palate and the tonsils may become implicated, as in cases observed by Bretonneau; the malady may then advance by the line of march which I have already pointed out, invading the larynx and trachea,

and at last causing death by croup. I shall now textually quote to you one of Bretonneau's illustrations.

"At the end of the epidemic," says Bretonneau, "eight children, between nine and ten years of age, who slept in the same dormitory at the Orphan Asylum, were attacked during the same week with scorbutic gangrene of the gums. I have noted a peculiarity which I am quite unable to explain, and which no circumstance of which I am aware offers any plausible explanation: all the eight were affected on the right side. From the second day of the invasion of the disease, three had the corresponding tonsil swollen and covered with pellicular deposit. Is it not possible," adds the author, "that the diphtheritic inflammation might have rapidly reached the larynx, had not its progress been arrested by the application of strong hydrochloric acid, the effect of which was so prompt and efficacious, that in a few hours after it was first applied the swelling of the lymphatic glands was sensibly diminished?"[1]

It is when diphtheria reaches the inside of the cheeks, that it has a tendency to terminate in gangrene. After remaining confined to the gums for one or several months, after remaining confined to the mucous membrane of the mouth for a period of which it is impossible to state the limits, an œdemato-phlegmonous swelling of the face supervenes: the skin of the face becomes red, the tissues acquire considerable hardness, and ere long gangrene of the mouth, with all its characteristics, involves the cheek, as well as the gum which was the starting point of the evil.

The identity of buccal and pharyngeal diphtheria with croup has been established beyond dispute by the researches of Bretonneau. It is fully proved by the fact, that the plastic affection of the gums may be propagated to the pharynx and larynx. Moreover, the case which I quoted to you of the infant who died almost simultaneously with the mother from malignant diphtheria, of which the first appearance was in the gums, also shows that there exists that complete identity in which I believe. One of my most distinguished colleagues, Dr. Jules Bergeron, physician to the Hôpital Sainte-Eugénie, in an interesting and conscientious work,[2] while he holds that the disease

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[1] Bretonneau:—Des Inflammations Spéciales du Tissu Muqueux, et en particulier de la Diphthérite, p. 127. Paris, 1826.

[2] Bergeron (Jules):—Stomatite Ulcéreuse des Soldats. [*Recueil de Mémoires de Médecine Militaire.*] Paris, 1859.

he describes is the same as that observed by Bretonneau in 1818, denies that ulcerous stomatitis is a diphtheritic affection. He rests his opinion upon two facts, viz., that in none of his cases of ulcerous stomatitis—all carefully observed—did the malady ever propagate itself beyond the gums, and that in none were there any symptoms of toxæmia. Against these arguments may be placed the cases observed by Bretonneau, in which the kind of propagation was seen of which Bergeron denies the occurrence. But by reading the lucidly drawn descriptions of Dr. Bergeron, it is easy to satisfy oneself, that the ulcerous stomatitis of which he speaks was very different from the plastic stomatitis of the legion of La Vendée: the single fact of the existence of ulcerations would suffice to establish this difference:—you can, I say, find the proof of the correctness of this statement in Bergeron's treatise, and in other works subsequently published on the subject. In diphtheria of the gums or mouth, the plastic exudation leaves uninjured the mucous membrane which it covers; or, at all events, there is nothing like real ulceration.

Apart from the possibility of the propagation of the disease to the pharynx and larynx, apart perhaps from that which shows itself as the first symptom of malignant diphtheria, plastic stomatitis is identical in its nature with other diphtheritic affections. This identity is further shown by the contagiousness of both affections. The plastic affection of the gums is not only communicated as stomatitis, but likewise as pharyngeal, or even as malignant diphtheria.

Thus, as I have told you, in the Tours epidemic of 1818, no one could recollect seeing cases of pseudo-membranous sore throat or croup prior to the arrival of the legion of La Vendée, which brought diphtheria to the town. I have also told you that the first cases occurred in the neighbourhood of the principal barracks, which were occupied by the soldiers of that legion. In a family, one member of whom was attacked with pseudo-membranous stomatitis, some were similarly affected, while others took pharyngeal diphtheria, croup, and cutaneous diphtheria. Such facts admit of being more easily ascertained when they occur in small districts, where physicians can trace the the malady back to its source, where, so to speak, they at a glance can understand what is going on, and follow, step by step, the invading march of the epidemic.

Nature of Diphtheria:—Contagion:—Alteration of the Blood:—Albuminuria.

Gentlemen:—At the period when Bretonneau wrote his treatise on diphtheria, medicine, French medicine at least—was under the dominion of the physiological doctrines of Broussais: his theory of inflammation reigned supreme throughout the entire domain of pathology, so that in all diseases, inflammation was regarded as the only element of which it was necessary to take account. Pinel, however, had shown that in different organic tissues, inflammation underwent very characteristic changes: the illustrious author of the *Nosographie Philosophique* had already thrown a great deal of light upon the history of diseases, and given a new impulse to the spirit of observation. Bretonneau, proceeding further than Pinel, in his turn showed, that the various inflammatory alterations, and the phenomena which accompany them, do not exclusively depend upon the specialty of the affected tissues: he demonstrated in his remarkable works on diphtheria and dothinenteria that the specific character of the inflammation, much more than its intensity, and much more than the nature of the tissue in which it is seated, exerts an influence upon the functional disturbance produced by each inflammatory lesion: it is, he said, to the specific character of the inflammation that the duration, severity, and danger of most pyrexiæ are attributable.

The malady which we are now studying was not regarded as an exception to the absolute rule which it was attempted to lay down. In pseudo-membranous sore throat and in croup, nothing was seen but an inflammation of the throat or larynx, which it was deemed essential to treat by antiphlogistic measures. Here, unquestionably, the inflammatory element may play its part: but this, so far from being the chief part, is quite subordinate; exactly as in small-pox, and measles, as well as in other diseases, it is subordinate to the nature of the presiding cause, which imposes on it its peculiar stamp.

There is, however, an essential difference between the diseases which I have just named and diphtheria: this difference consists in the greater importance which in diphtheria attaches to the local affection. In small-pox for example, we look at the pustules chiefly in relation to their diagnostic and prognostic significance, but in diphtheria, we

regard the local manifestations from the *treatment* point of view. In diphtheria, it is just as in malignant pustule, in which malady, by making a direct attack upon the local affection, we stop the progress of the general disease of which the pustule is the first manifestation. So is it also in diphtheria: by energetically treating the local affection, as soon as it shows itself, we arrest its progress, and prevent the occurrence of ulterior symptoms. I shall return to this point, when I come to discuss the subject of treatment.

Whatever local manifestations, and whatever general forms diphtheria may assume, it is always, in its essential nature, the same disease: it is the same disease whether it affect the mucous membranes or the skin; whether it appear as a pharyngeal, laryngeal, or bronchial affection, as stomatitis, as plastic coryza, or as a cutaneous, vulvar, anal, or preputial affection, it is the same. The diversity of aspect presented by the local affections depends solely upon the diversity in the nature of the tissues in which the morbid action shows itself: the different manifestations all originate in one sole cause. The indisputable correctness of this statement is shown by what takes place in epidemics, when we see diphtheria transmitted from person to person, assuming a variety of forms, and exhibiting great diversity in its localisation; when, for instance, we see a patient who is affected with diphtheria of the gums communicate to other persons pseudo-membranous sore throat, croup, cutaneous diphtheria, or some other form of the pellicular disease. Dr. Guersant mentions a case in which diphtheria of the prepuce in a child was the starting point of pseudo-membranous sore throat in the brother and the father.

Looking at the great differences which there are in the symptoms presented by the different forms of the disease, it might seem that that form which kills by attacking the air passages—*simple* or *genuine* diphtheria,—and that which kills by general poisoning—*malignant* diphtheria—are in their nature, very distinct from one another. But it is not so, Gentlemen; under this diversity of form, just as amid the variety of the local affections, it is always the same disease which we encounter: it is always diphtheria, just as it is always small-pox, whether the form be confluent or distinct, mild or malignant. The transformations which the disease undergoes in accordance with the nature of the epidemic depend on I know not what—on a something which we agree to call the character of the epidemic [*génie épidémique*]: this diversity of form met with in the same epidemic depends upon

the natural or acquired peculiarity of the individual. From this point of view, the comparison which I have made between diphtheria and small-pox appears to me all the more appropriate, that, besides the simple and malignant forms of which I have spoken, the pellicular disease assumes an aspect which is analogous to the relation which modified small-pox bears to small-pox. Indeed, in some epidemics, individuals are seen to take sore throats, which, in respect of anatomical characters, seem to be of the common membranous kind, such as result from herpes of the pharynx, or even simple sore throat; while they are in reality diphtheritic sore throats, modified in a remarkable manner. That which makes my comparison thoroughly appropriate, that which proves the identity of the nature of the different forms of diphtheria is, that each of them, in passing from one individual to another, may declare itself under a particular form: modified diphtheritic sore throat, for example, may give either simple or malignant diphtheria, just as modified small-pox may give distinct or confluent small-pox; and *vice versa*. At the meeting of the Medical Society of the Parisian Hospitals, held on the 25th August, 1858, my honorable colleague Dr. Alphonse Guérard stated the following circumstances, which, within a period of about six weeks, he had recently observed in one family. A child died of laryngeal croup: two days afterwards, two young girls took erythematous sore throat, and were attended by our lamented brother, Dr. Gillette. Some days later, the father, aged forty-five, a patient of Dr. Guérard took a pseudo-membranous pharyngeal sore throat. Two other children of the family were next attacked, one with simple, and the other with membranous sore throat.

A similar history was communicated by Dr. Henri Roger to Dr. Peter, who has published it in his inaugural thesis.

"G., aged two months, was seized with membranous sore throat on the 17th May, which proved fatal on the 22nd. During the evening of the 21st, the mother, a woman twenty-two years of age, had general discomfort and fever. There was also sore throat; and within twenty-four hours, a whitish speck appeared on the right tonsil. On the following day, false membrane was observed on both tonsils. The submaxillary glands were engorged, and chaps round the nipple were covered with pellicular deposit. During the following days, the general and local symptoms became more severe. Ultimately, there was a gradual and slow amendment. At the beginning of June, the false membranes had completely disappeared; but there was an

abscess in the right tonsil. The woman was, however, quite well by the 11th June."

"The child's nurse, a woman aged 33, was seized with sore throat, which was severe, but not pseudo-membranous. In this case, the malady continued for thirteen days—that is, from the 23rd May to the 4th June."

The father of the child G., a man of 35 years of age, had a simple sore throat of average severity, which lasted four days—that is, from the 25th to the 29th June."

"The child's grandfather and grandmother, who went daily to see their children, particularly the grandmother who had attended upon them, had very mild sore throats."

"A lady residing in the neighbourhood, a friend of the family, who came often to the house, was attacked by laryngitis."

The cook, a woman above forty, had no symptom of sore throat."[1]

Dr. Peter follows up this group of cases with some remarks in which I cordially concur. He then, in contrast with the cases just quoted, in which the severity of the cases diminished progressively in transmission from children to adults, mentions another series of cases, in which there was an inverse progress of the malady, in which it passed from adults to a child, and from that child to an oldish man. The following is the history of the disease in the family in question.

The husband of the female servant was the first who took ill: he communicated pseudo-membranous sore throat to his wife: she recovered. Six days later, the child of the master of the house, twenty-six months old, was attacked by pharyngeal diphtheria: then, on the twelfth day, the larynx was invaded; and next day, when Dr. Gillette did me the honour to consult with me on the case, the croup was far advanced. In the evening, Dr. Peter performed tracheotomy; but this did not save the child, who died on the fourth day after the operation.

It was from this child, when he was attending upon him, that our lamented brother Gillette took diphtheria, from the consequent croup of which he died, without tracheotomy having been tried, as the pseudo-membranous exudation had reached the bronchial tubes.

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[1] Peter (Michel):—Recherches sur la Diphthérite et le Croup. Paris, 1859.

Diphtheria, then, is preeminently a specific disease, the different local and general forms of which, constituting merely varieties of a species, are attributable to the action of the same morbific principle, a specific morbid poison: in a word, it is a pestilential disease. Like all diseases of an unquestionably specific character, it is contagious; and perhaps is inoculable. The cases, however, which have been brought forward in proof of the possibility of inoculating diphtheria, particularly those communicated to the Hospitals' Medical Society by Dr. Bergeron, are very open to be called in question, and the experiments performed with a view to arrive at a rigorous demonstration of facts have as yet been barren of results. I am not speaking of the experiments made on animals, for it is admitted that in respect of inoculation in the human subject, no conclusions can be derived from experiments made on animals: I am only referring at present to the inoculation of the disease from man to man. In 1828, I tried ineffectually to inoculate myself with diphtheria, by means of punctures on the left arm, tonsils, and veil of the palate, made with a lancet moistened by contact with a false membrane which I had just removed from a diphtheritic sore. Dr. Peter, in the excellent work which I have already quoted several times, states that upon three occasions he repeated the same experiment on himself without obtaining any result. In the first instance, when performing tracheotomy on a child, he received on the surface of the cornea of the left eye, a semi-liquid pseudo-membranous exudation, which for a moment covered the globe of the eye, and the most fluid part of which insinuated itself under the eyelids: he did not wash the eye, yet no consequences followed the occurrence described. On the second occasion, he made three punctures in the lower lip, with a lancet moistened with semi-fluid diphtheritic exudation: he experienced no derangement of health from the proceeding. On the third occasion, this daring experimenter painted the tonsils, the pillers of the veil of the palate, and the back of the pharynx by means of a dossil of charpie soaked in diphtheritic matter: again, the result was negative. It therefore seems possible, Gentlemen, from these experiments, that diphtheria is not more inoculable than measles, scarlatina, and whooping-cough, maladies the contagious character of which no one doubts.

If any one, in times past, has for a moment denied the *contagious* character of diphtheria, forgetting the observations of our predecessors, among others those of Rosen, and long before him, those of

Cortesius, and de Wedel, no one in the present day could dispute that it is contagious. Bretonneau, in his treatise on diphtheria, called attention to this point, and again, in a more special manner, returned to the subject, in his last work, which appeared in the *Archives Générales de Médecine* for the year 1855. Numerous facts are therein collected from the history of epidemics in all quarters. Nevertheless, it is not always easy to perceive the manner in which the disease has been transmitted from one place to another. In some instances, however, one can trace it back to its origin; and that can be done in the following case, the history of which is undoubtedly authentic.

The epidemic of diphtheria which prevailed at Fresnay-le-Ravier, *arrondissement* of Nevers, in 1858, had as its starting point a child who had been brought from Paris. That child died, also the infant of the nurse, and the nurse herself. The scourge then broke out in the village.

Once diphtheria enters a house, it has an undoubted tendency to propagate itself by contact from individual to individual. How frequently we see almost all the children in a family attacked in succession, while the father, mother, and attendants on the sick are also brought more or less under the influence of the disease! I have given you examples of this; and, as you are aware, the medical profession has paid a heavy tribute in life to the contagious power of this frightful disease. I have already mentioned Valleix, Henri Blache, and Gillette, to which list, too long though it be, there remain, I doubt not, other names to be added.

It appears then, that the question of the contagious character of diphtheria is at present generally answered in the affirmative. It was lately under discussion in the Hospitals' Medical Society, and the subject of an excellent communication by Dr. Henri Roger, in which his object was to establish, on the basis of a series of authentic and rigorously observed cases, not only the contagious character of diphtheria, but likewise the duration of the incubation of the diphtheritic poison. From these researches, it seems that the period of incubation generally ranges between two and seven days: you must bear in mind, however, that in consequence of the impossibility of inoculating diphtheria, this statement must be regarded as only a near approximation to the truth.

I have told you, that diphtheria, in its malignant form, kills after the manner of septic diseases, by a sort of general and complete

poisoning of the system. This poisoning shows itself during life by the local and general symptoms which I have described: it is characterised by a peculiar alteration in the blood, which is found on necroscopic observation; also by *albuminuria*, a functional disturbance, met with in a great number of septic diseases, such as variola, scarlatina, dothinenteria, and cholera; and finally, it is characterised by paralytic complications, to which, from their great importance, I mean to dedicate an entire lecture.

The *alteration of the blood*, to which I to-day call your attention, was first pointed out by my young colleague, Dr. Millard, in his excellent inaugural thesis;[1] and it has more recently been discussed in Dr. Peter's work, published in 1859. At the autopsy of six persons who died of croup complicated with plastic coryza, a complication which I mentioned as occurring in malignant diphtheria, Dr. Millard five times met with this alteration of the blood, which till then had not been described by any one. I must add that Dr. Millard states that the sixth case was too imperfectly observed to justify a negative conclusion in respect of it. This alteration of the blood consists in a very marked change in its colour: in place of being of a more or less deep red, it is brown. Dr. Millard compares this to the juice of plums, and to the juice of liquorice: he says it stains the fingers almost as much as sepia. Dr. Peter compares it to water coloured by soot. The viscera and mucous membranes being impregnated with it, present a dirty hue, which is quite characteristic. This blood is turbid, and somewhat muddy: the clots formed are soft, and somewhat resemble the over-cooked juice of the grape [*résiné trop-cuit*]. The arteries, instead of being found empty after death, as is generally the case, contain nearly as much blood as the veins.

I have now reached the subject of *albuminuria*. Gentlemen, several years ago, an English physician, Dr. Wade of Birmingham, announced that he had found albumen in the urine of diphtheritic patients, and also that its presence was a frequent phenomenon in mortal cases. He supported his own experience by quoting that of his colleagues, mentioning that this fact had been observed by several physicians, and among others by Dr. James, who published an interesting account of an epidemic of croup in the *Medical Times*. Dr. Wade states that in consequence of his having communicated his

[1] Millard:—Sur la Trachéotomie dans le Croup. Paris, 1858.

observations to the Royal Medical and Chirurgical Society, confirmatory cases were at once brought forward by Dr. Robins and others. This discovery, from having been originally published in the *Midland Quarterly Journal of Medical Science*, a periodical little circulated on this side the Straits of Dover, remained for a long time unknown in France. Like every body else, I was ignorant of the discovery, when there fell into my hands an unpublished paper by Dr. Abeille, who was the first to my knowledge, to mention diphtheria among the diseases in which we may meet with albuminuria. Since that time, I have lost no opportunity of looking for albumen, which I have several times found in the urine of diphtheritic patients in the clinical wards, and did not fail to notice in my clinical lectures during 1857. In a lecture delivered on the 23rd June, 1858, Dr. G. Sée, ignorant of the researches of the English physicians and of Dr. Abeille, in a more particular manner called general attention to the frequency of albuminuria occurring in malignant sore throat, and in croup both before and after tracheotomy. He stated that in his wards in the Children's Hospital, the urine of all the diphtheritic patients was examined for albumen every day, and that at least in one third of the cases, it was found in notable quantity. It is, therefore, as Dr. Wade originally stated, and as I have verified before you, very common to find albumen in the urine of diphtheritic patients.

The phenomenon has been explained in several ways. Some have looked on the cause as possibly of a complex character, thinking that the presence of albumen in the blood might depend in some cases upon passive transient congestion of the kidneys produced by asphyxia in croup, and the consequent stasis of the blood. This theory is very open to objections, even in the exceptional cases to which attempts have been made to apply it. With the majority of physicians, I believe that the occurrence of albumen in the urine of diphtheritic patients is dependent upon the general state of the system: we find here, but cannot explain why, the same condition we meet in such septic diseases as small-pox, scarlatina, and dothinenteria. In some cases, albumen is found in the urine from the very onset of the disease; the quantity obtained by treatment with heat and nitric acid varies considerably in the same individual from one day to another: sometimes, its appearance is intermittent. You may remember a case of this kind which occurred in a young woman who lay in bed No. 9 of St. Bernard's ward, the history of which I shall bring before you in relation to the subject of diphtheritic para-

lysis: you will remember that the variations in the quantity of albumen which we found in the urine of this patient did not in any way correspond with the increase or decrease of the paralytic symptoms, and that it was useless to attempt to form a prognosis from what was seen in the test-tube. In point of fact, however interesting this phenomenon may be, it is impossible in the present state of our knowledge to arrive at any absolute induction from it. It is quite correct to say, in general terms, that in severe cases of diphtheria, albuminuria is usually met with: but the exceptions to this rule are numerous. Again, we sometimes meet with albuminuria in slight, and find that it is absent in serious cases. An attempt has been made to explain by albuminuria the paralytic affections regarding which I am, forthwith, going to address you. I may remark, however, that albuminuria is not a constant symptom in that class of cases; and also, that the paralytic affections incident to diphtheria do not admit of comparison with the symptoms of disturbance of the nervous system which supervene in the course of acute or chronic albuminuria, which are characterised by convulsions or coma, and, with the exception of amaurosis, never by paralysis. One word more on this subject. Although Dr. Wade states that he has never seen dropsy accompany diphtheritic albuminuria, dropsical affections are, according to Dr. G. Sée sometimes met with, though much more rarely, he says, than in scarlatina. For my part, I have met with but few examples; and so far as I can make a statement on such a point from memory, I should say that I have not met with this anasarca in one case in twenty.

To sum up:—The presence of albumen in the urine of diphtheritic patients, whether the disease be in the form of pseudo-membranous sore throat, croup, or cutaneous diphtheria, is a frequent occurrence, but one which in the actual state of our knowledge has only a limited signification in relation to prognosis and treatment. It is, however, impossible, to deny that it is the expression of a great disturbance of the organism, produced by the morbific principle which engenders diphtheria.

Paralysis in Diphtheria.

Not a New Disease.—The Mild Form.—Symptoms.—Paralysis of the Veil of the Palate, of the Senses, Limbs, and of the Muscles of Organic Life.—Death by Suffocation, by Strangling.—The Aggravated Form.—Ataxo-adynamic Symptoms.—The Gravity of the Paralysis bears neither any Relation to the Intensity or Duration of the Pseudo-membranous Affection, nor to the Albuminuria. This kind of Paralysis is the Result of Poisoning.—Treatment.

Gentlemen:—We stopped for a long time when going round St. Bernard's ward beside a young woman who was stretched out on an easy-chair, whence it was impossible for her to raise herself. This patient, who occupied bed No. 10 of that ward, had been struck with paralysis three months previously. Under our own eyes, we saw the gradual development of the symptoms. She now presents a remarkable example of the paralysis consecutive to diphtheria, an affection which certainly is not new, but which has not, till very recently, been accurately studied.

This case, which gives me an opportunity of addressing you to-day on this subject, is so interesting, that I do not hesitate to lay it before you with some minuteness of detail. The patient, aged 28, came into the clinical wards on the 6th August, 1859. Eight days previously, she had had feelings of general discomfort, and had suffered from severe headache: she also had had fever, sore throat, and profuse sweating: on the day following, she had vomiting and loss of appetite.

There was a special circumstance connected with this young woman which it is important to note: she had, only fifteen days before the seizure now described, left our wards, where she had been under treatment for lumbago: she had during that period occupied the bed adjoining that of a woman with diphtheria, whose infant had died from croup. It was probably from them that she contracted the disease which brought her back to the Hôtel-Dieu.

At the morning visit on the 7th August, I saw that there was very extensive plastic sore throat: the uvula and tonsils were entirely covered with false membranes, and presented more than one greyish white surface. I immediately cauterised the affected parts with

hydrochloric acid. I prescribed insufflations of alum, and directed them to be used several times during the twenty-four hours: also, a julep containing six grammes [93 grains], of the perchloride of iron; and also the powder of cinchona in infusion of coffee.

Next day, I was shown a very thick false membrane, which had been detached from the throat: this diphtheritic deposit was in length, two centimeters and a half, and in breadth, one centimeter. On the free surface, traces were visible of the cauterization of the previous evening, and at the part where the eschar adhered to the mucous membrane, the latter was furrowed by fine red arborisations. In the cavity of the mouth, the false membrane was less abundant, and was found only on the uvula and posterior pillars of the veil of the palate. The cervical glands, particularly those of the right side, were engorged. On examining the urine, we found that it contained a considerable quantity of albumen. The julep with perchloride of iron was continued, and the quantity of the latter was increased to eight grammes [two drachms, and four grains:] I then introduced into the throat water strongly charged with tannin, using the apparatus constructed in accordance with the suggestions of Dr. Salces-Girous for the inhalation of medicated waters.

During the night of the 8th and 9th August, the patient was seized with a fit of difficult breathing, which made it necessary to call the pupil on duty, who removed from the pharynx a thick false membrane, which was the cause of the attack. From the date of this occurrence, the false membrane became from day to day thinner and less extensive. On the 11th, after having removed a very thin layer, I cauterised with hydrochloric acid the surface which had been covered by false membrane; and on the 16th, there only remained a few small white spots. The diphtheria seemed to be permanently stopped. Nevertheless, the perchloride of iron was taken to the extent of ten grammes [155 grains] a day up to the 23rd of August, after which it was discontinued.

The urine, however, when treated by heat and nitric acid, still yielded a considerable precipitate of albumen. To state at once all that refers to this symptom:—from 15th August to the 12th September, though great variations occurred in the amount of albuminous precipitate, there was a progressive diminution, and on the 12th September, I noted on the report-sheet, that there was "very little albumen in the urine," but within a few days it reappeared in as great abundance as at first. This recrudescence of the albu-

minuria coincided with the manifestation on the 14th of the special nervous symptoms on which I am going to make some remarks. For three days, the albuminous precipitate was very abundant: on 17th September, there was none, but on the 18th, there was a slight trace: this reappearance of albumen was very transient; and by the 20th September, the albuminuria had finally ceased.

From the 12th August—the malady being then in its ninth day—the uvula was quite free from false membrane, but on the right tonsil there was some, and on the left, an exceedingly slight trace: elsewhere, there was none. But a symptom existed which claimed my serious attention: this was a nasal tone of voice, indicating incipient paralysis of the veil of the palate: from day to day, this snivelling increased. On the 15th, on trying the strength of the patient, by Dr. Burq's dynamometer, I found that the pressure of the right hand was 27, and of the left, 22 kilogrammes. Three days later, the paralysis of the veil of the palate had increased: drinks and liquid food returned by the nose. On 20th August, the young woman complained of general weakness, and of formication in the feet: she marked on the dynamometer 23 kilogrammes by the right, and twenty by the left hand. On the 23rd, the hands were benumbed, and, like the feet, were the seat of formication: she could not walk without stumbling. On the 25th, I ascertained that she was in an anæsthetic state. I could prick her without her being aware of it. On applying the æsthesimeter to the dorsal surface of the left forearm, she did not feel distinctly the two points of the instrument when six centimeters apart from one another. The arms were extended, and the hands were in a state of constant tremulous motion. Not only were fluids swallowed with difficulty, but even solid food caused pain in passing the isthmus of the fauces—to use the expression of the patient—the morsels remained sticking in the throat. For some days, this dysphagia went on increasing in severity. On 31st August, new symptoms arose. When this unfortunate young woman was breathing, we heard a slight whistling sound during inspiration, like that produced in persons suffering from what is called œdema of the glottis. From the previous evening, she had been suffering much from difficulty of breathing, and the inspirations were 54 in the minute. On examining the chest by auscultation and percussion, we found no abnormal condition. On 2nd September, the lips and tongue were affected with paralysis. The patient felt numbness and formication, and she had difficulty in articulating.

The difficulty in speaking increased, as well as the dyspnœa. The gums were insensible, and the teeth ceased to feel the food which they masticated. I then had recourse to electricity, which I caused to be applied to the anterior and lateral parts of the neck; and likewise over the epigastric region, having a suspicion that the dyspnœa was referable to the diaphragm, which was paralysed like the other muscles. On the fifth day of this treatment, the patient told me that she could swallow and breathe more easily. She was, however, very far from having got rid of her untoward symptoms. On 11th September, her sight became affected. Vision was dim; she could not read, and the letters looked as if in confusion. The difficulty of articulating had become still more marked: the hands, but not the feet, continued to be benumbed.

It was at this period, let me remind you, that the albumen reappeared in considerable quantity in the urine after having greatly diminished: it was also at this period, that is to say about the 14th of September, that the patient was seized during the visit with the nervous symptoms to which I have already alluded: she had been complaining since the morning of a tremulous movement of the hands. Just as I was leaving her bed, I perceived her all at once become affected with violent convulsive movements in both arms, the eyelids, and muscles of the eye: the globe of the eye was turned upwards. These convulsions lasted for more than an hour, consciousness remaining perfect during the whole time. This woman had never had previously any nervous attack. I prescribed the following potion:—mint water 80 grammes [about 22 fluid drachms]; syrup of ether, 40 grammes [about 11 fluid drachms]; musk, 1 gramme [15½ grains]. Next day, she was very calm. During the night of the 15th and 16th, the convulsions returned, affecting on this occasion the muscles of the face and jaw. At the visit, I observed great dyspnœa, and much difficulty in articulating: there was, however, less dysphagia. The left leg was much weaker than the right, and bent under the weight of the body. There was no loss of power in the upper extremities, but they continued to be the seat of formication. On 22nd September, both legs were affected with feebleness, and to such a degree as to render both walking and standing impossible: the evacuation of the bowels was accomplished with great difficulty. The degree of feebleness and accompanying numbness was variable. Thus, while on the 22nd, the patient was quite unaware of the existence of her toes, next day

that disagreeable state had passed away. There was, however, a decided increase in the weakness of the legs. On the 26th September, she was completely paraplegic: there was vesical tenesmus, then difficulty in micturition—a true paralysis of the bladder. The dyspnœa, difficulty in passing urine, and impeded articulation gradually diminished; and to-day you have seen the patient breathe, swallow, and speak with ease. The employment of electricity was continued; it was applied in succession to the parts affected with paralysis. From 1st October, the numbness of the legs began to diminish; and they gradually recovered their power. On the 7th, the patient could get up and sit on the side of her bed, although she was still unable to walk. On the 11th, in tottering fashion, she began to take a few steps: when she walked, she did not feel the ground under her feet.

It was difficult, Gentlemen, in this case, not to recognise the relation between the paralytic symptoms which we saw develop themselves under our own eyes, and the diphtheria with which the young woman was still affected when they showed themselves. If cases always presented themselves to physicians in this clear form, it is probable that diphtheritic paralysis could not have escaped notice: for assuredly the malady is not new, as some have supposed.

What has happened in connection with it, has happened in relation to many other morbid conditions. Albuminuria, which we have only been acquainted with for a few years, is now quite commonly met with. I may say the same in respect of leucocythemia: indeed this example is particularly striking, for though the affection was till the other day quite unknown, there is now not an hospital in which cases of it are not met with. Albuminuria and leucocythemia are not new affections, nor are they more common now than in former times, but in the present day, they are recognised when met with, whereas formerly, they occurred without attracting attention: the researches of Bright drew our attention to the former, and the latter has been brought under our notice by Bennett, Virchow, E. Vidal, and Magnus Huss. Precisely the same thing has occurred in respect of the paralysis attendant upon diphtheria. As it does not in general supervene till a period somewhat remote from the manifestation of the local characteristics of the pellicular malady, it is easy to see how its origin and cause have not always been understood.

When we refer to the historical records which have come down to

us, descriptive of the *Mal Egyptiaque*—very ancient records dating back to the times of Aretæus, we find only exceedingly slight references to the consecutive paralysis. Some distinctly mention the extreme debility which follows diphtheria, but strictly speaking no one says anything of paralysis. Its existence, however, was categorically stated by three authors—Ghisi, Chomel, and Samuel Bard—at the middle and end of last century. All the three completely establish the correlation of paralysis with diphtheria.

The case related by Ghisi, in his second medical letter upon the epidemic sore throat which prevailed at Cremona in 1747 and 1748, is that of his own son, a child a little under eight years of age. The following are the concluding sentences of the narrative :—

"Leaving to the patience and skill of M. Ch. Scotti, doctor in surgery, the treatment of large ulcers occupying both tonsils, and part of the veil of the palate and uvula, I also entrusted to him the treatment of a large painful tumour, which, at the very time that the interior of the throat had got nearly well, began to point externally and to form an abcess a little below the angle of the jaw, under the mastoid muscle. I left to nature the cure of the strange consequences of the disease, *consequences which had been remarked in many who had already recovered*, and which continued for about a month after recovery from the sore throat and abscess. During that period, the child spoke through his nose; and food, particularly that which was least solid, returned through the nares, in place of passing down the gullet."

Also in 1748, Chomel, a French physician, observed in two patients, paralysis consequent upon gangrenous sore throat. In one of these cases, it was unquestionably the same paralysis of the veil of the palate which Ghisi pointed out. "The patient," says Chomel, "had not quite commenced convalescence at the forty-fifth day of the disease, having still difficulty in articulating, speaking through the nose, and having the uvula pendulous. In the other case, however, the complications were different from paralysis of the veil of the palate :—"the patient became squint-eyed and deformed; but day by day, as his strength returned, he regained his natural appearance."

Samuel Bard, who has written an account of the epidemic sore throat which, in 1771, prevailed in the town and province of New York, describes the case of a little girl, two and a half years old, who recovered from an attack of suffocative sore throat, and

cutaneous diphtheria consequent upon the application of blisters; but who retained paralysis of the veil of the palate and weakness of the legs. "The larynx," says Dr. Bard, "retained a special sensibility in respect of liquids: whenever she attempted to drink, she was seized with a fit of coughing, yet she was able to swallow solid food without any difficulty. These symptoms passed off, with the exception of weakness and aphonia, which continued for some time longer. In the second month, she could with difficulty walk alone, or raise her voice above a whisper."

These cases had remained unknown. Bretonneau, even, in his treatise on diphtheria, gave a translation of Ghisi's letter and Samuel Ward's observations without stopping to notice the point now before us. My illustrious master's attention had not then been called to the subject: in the epidemic with which he had just been engaged, he had not seen any cases of diphtheritic paralysis; nor did he remember to have met with any cases prior to 1843. The first patient in whom he met with it was Dr. Herpin, a surgeon to the hospital of Tours. Bretonneau published this case, exactly as it was communicated to him by Dr. Herpin, in his paper on the means of preventing the development and progress of diphtheria, which appeared in the *Archives Générales de Médecine* for January and September 1855. From that time, the occurrence of paralysis as a sequel of diphtheria was a fact completely established in the minds of the physicians of the school of Tours; but at Paris, the subject was almost unnoticed, or at least it was not till long after its existence had been pointed out, that the relationship between the paralytic affections and the disease which produced them was fully appreciated.

Eight years ago, I and others were struck by the frequency with which paralysis of the veil of the palate occurred in persons who had had diphtheria. The patients, adults and children, had a nasal tone of voice, and great difficulty in swallowing. In endeavouring to explain these cases, I imagined that the paralysis depended upon a special modification of the veil of the palate produced by the plastic inflammation, a modification in virtue of which the muscular fibre constituting part of that structure, for a certain time, loses its normal contractility. This was the explanation given by my friend Dr. Lasègue and me in our paper on the subject published in the *Union Médicale* for 9th October, 1854. As that paper referred only to paralysis of the veil of the palate, our explanation was to a certain extent admissible,

for one could compare what happened in diphtheritic sore throat with what sometimes occurs in purely inflammatory sore throat, in which we also meet with this consecutive paralysis; and, speaking in more general terms, with what occurs in all muscular tissue which has been for a time the seat of simple or rheumatic inflammation. Long before that period, however, I had seen other cases of diphtheritic paralysis, both local and general, affecting the eyes and the tongue; but I had seen them without being able to explain their nature, without having laid hold of the relation of the disturbed innervation to the disease in which they originated. Thus, in 1833, a remarkable case came under my observation when I was doing temporary duty in these wards for Récamier. The facts of the case were carefully reported by my lamented friend Dr. Thirial.

The patient was a young woman, twenty-two years of age, who was admitted as a patient into the Hôtel-Dieu on the 13th June. The superior and inferior extremities were both completely paralysed. With the right arm, she could hardly perform slight extension movements: the fingers were retracted, flexed in the palm of the hand, and when an attempt was made to extend them, pain was excited. The paralysis of the left arm was neither so generally diffused, nor in any part so complete. The patient was wholly unable to move the right inferior extremity; and she was nearly as much paralysed in the left, with this exception, that she could push it out and slightly draw it back, in consequence of power remaining in the muscles of the pelvis.

There was a certain amount of difficulty in voiding the urine and fæces.

Notwithstanding the almost total loss of the general motor power of both sides of the body, sensation remained intact in the paralysed limbs. The heat of the parts was a little below the natural standard, but they were perfectly sensible to the contact of the hand, and to differences of temperature.

The organs of the senses, as well as the mental faculties, were not impaired in the slightest degree. Speech was free: my questions were answered with remarkable correctness and precision. The pulse was natural. There was not much appetite, but digestion was good.

This young woman was an inhabitant of a village in the department of Haute-Marne, whence she had come to Paris for treatment. She stated that she had been confined on the 14th February, conse-

quently four months before she was received into the Hôtel-Dieu. Parturition was perfectly propitious; but about fifteen days after delivery, she was seized with sore throat possessing the character of pseudo-membranous sore throat, from which she was very ill, and in great danger. The village doctor under whose care she had been, had first taken blood from the feet, then applied (on different occasions) sixty leeches, and afterwards blistered the calves of the legs: he did not however employ any topical treatment. The patient stated that the surfaces to which the blisters had been applied became covered with false membrane: this statement, as Thirial has remarked, put beyond doubt the nature of the sore throat—its serious and contagious character.

Notwithstanding the insufficiency, let me add, in spite of the absurdity of this treatment, the patient had the good fortune to get better; but it was not till after the lapse of a considerable time that convalescence began. Indeed, she stated that she had not commenced getting up till about the 10th April, that is to say, not till more than six weeks from the beginning of the diphtheritic attack.

The first time that she tried to stand or walk, she observed a certain awkwardness in the movements of the right leg: she could not maintain the erect position, nor make a few steps without the aid of a staff. The physician to whom she complained of these symptoms, paid little attention to them, ascribing them to debility, the natural consequence of so long an illness. It is probable that a similar error has, in times past been often committed, and that to a certain extent the commission of this error explains the silence observed in reference to paralysis in diphtheria. Our patient, some days after making her complaints, began to suffer from very disagreeable formication in the weak leg, and to experience considerable and increasing difficulty in moving it. In a word, at the end of a fortnight, there was complete paralysis of the right inferior extremity; and the left arm became afterwards similarly affected. After some time, the formication was felt over the whole of the left side of the body: and soon afterwards, the motor power began to diminish simultaneously in the upper and lower extremity. About the end of May, the patient ceased to be able to stand, even with the assistance of a support, and was thenceforth obliged to keep her bed. After remaining in this condition for a fortnight, the patient's family resolved to send her to Paris for treatment. Thus it was that she came into the Hôtel-Dieu in the condition which I have just described to you.

This, Gentlemen, was assuredly a case exceedingly well characterised, and seems to be one which in the present day nobody ought to have mistaken. Nevertheless, notwithstanding the various hypotheses successively suggested by the numerous physicians following the clinic, both as to the nature and seat of the disease, the true diagnosis of this woman's case escaped me during the whole time she was under my treatment in hospital, which was two complete months. At the end of that period, being three months after the setting in of the paralytic symptoms, the recovery was perfect. No one, I repeat, seized the relation between this woman's paralysis and her antecedent diphtheria, during the time she was in our wards. As for myself, I never should have got at the correct diagnosis, had I not at a later period met with similar cases.

In 1846, my honourable colleague, Dr. Vosseur, summoned me to see with him the female child of a joiner living in the Impasse des Feuillantines, Rue Saint-Jacques. The child had paralysis of the veil of the palate: she also had strabismus; and a leg and arm were paralysed. At first, I supposed that it was a case of hemiplegia depending upon a tubercular lesion of the brain. In a fortnight, the child died: before death, the paralysis had extended to the whole body.

These cases, however, were, like the first, a dead letter to me. Yet I was acquainted with the case described by Dr. Herpin of Tours. Bretonneau narrated it to me, and said that it was a case of diphtheritic paralysis. The statement seemed to me incredible. I refused to see anything more in the case than a coincidence; and when, in 1851, Dr. Lasègue and I published our work on paralysis of the veil of the palate, I was quite satisfied with the explanation which I there gave of that affection: I did not perceive that in its nature paralysis of the veil of the palate was similar to paralysis of the limbs, sight, &c. It was not till about the year 1852, that, enlightened by new cases, better studied and better interpreted, I understood diphtheritic paralysis as Bretonneau understood it. From that time, whenever an opportunity occurred, I, in my turn, called the attention of my colleagues to this important subject; and in this place, since 1855, I have pointed out to you cases of this kind. These cases I shall to-day recall to your recollection.

In 1852, I saw, along with my colleagues Drs. Beylard, Olliffe, and Bigelow, an American young lady who had frightful diphtheria, which invaded the pharynx, nasal fossæ, and internal surface of the

eyelids. For three weeks, the patient's life was in the balance. She recovered: but during the course of her illness, she fell into an extraordinary state of adynamia. Before her attack, she was in blooming health, and had a remarkably fresh complexion; but, from the third day of her membranous sore throat, she became as pale as the palest of chlorotic women, and in addition to this deprivation of colour, the skin presented a bloated appearance. Being at that time ignorant of the connection of albuminuria with diphtheria, I did not examine the urine. Notwithstanding, I repeat, the severity of the symptoms, the patient recovered; that is to say, the pseudo-membranous affections completely disappeared: but we soon had other very formidable morbid symptoms to contend against. We first had paralysis of the veil of the palate and of the pharynx which constituted an almost complete obstacle to deglutition: whenever the girl tried to take any kind of liquid, it was at once returned by the nose. For some time it was necessary to give aliment only in the solid form, and nourish her with chocolate prepared with water, and meat broth. At the same time, it was necessary to plug the nose in such a way that the column of air contained in the nasal fossæ, by presenting an obstacle to the return of the food, should perform the office of the veil of the palate. This contrivance proved successful.

To this paralysis of the veil of the palate, which was also characterised by a nasal tone of voice, there was added paralysis of the visual apparatus. The patient became amblyopic and ultimately amaurotic. The arms became affected; and along with loss of motor power, there was loss of sensation. Subsequently, the inferior extremities became paralysed. Six weeks after recovery from the pseudo-membranous affection, the paralysis was so general that the patient was unable to stir, and so was compelled to remain in bed. Four months elapsed before she could walk in her room supported by two persons, or carry the spoon to her mouth and take her food without assistance. It required a year to complete her recovery. She is now in perfect health.

I related the particulars of this case to my friend Dr. Blache, as well as to several of my hospital colleagues: it recalled to their recollection some other cases of a similar nature which till then had not arrested their attention. Some time afterwards, Dr. Faure called me in to consult with him in the case of a child, a girl between four and five years of age, who was recovering from a diphtheritic

affection. She had paraplegia of the same description as that of my young American lady, with this difference, that there was a sort of alternation in the paralytic symptoms: for example, an arm would be affected now, and by-and-by a leg. At the same time that Dr. Faure consulted me in this case, he published an account of it in the *Union Médicale*. This case dates back for about five or six years. The recovery was very rapid.

In 1858, I was asked by Dr. Arnal to meet him in consultation on the case of an exchange-agent. Dr. Arnal informed me that his patient, after having been attacked with paralysis of the veil of the palate, experienced considerable feebleness of vision, then paraplegia, paralysis of the upper extremities: the muscles of the neck became unable to support the head in its natural position; and finally, there was anaphrodisia. In listening to the patient's replies to my questions regarding his case, I observed a nasal tone of voice, and an aggregate of paralytic affections which led me to think that the symptoms depended on antecedent diphtheria. This was the truth.

Nowadays, that is to say, since the publication of Bretonneau's paper in the *Archives*, diphtheritic paralysis has been, so to speak, the order of the day, and has been discussed in several inaugural theses; particularly in 1858, in his thesis by Dr. Pératé, and, in 1859, by Dr. Péry, who specially devoted his inaugural dissertation to the subject. However, the most extended work which has yet been devoted to diphtheritic paralysis is that which Dr. Maingault presented to the Medical Society of the Hospitals. The author has collected above fifty cases, six of which were seen by himself; and upon this collection of cases is based the treatise which he has recently published.[1]

For some time past, numerous cases of this kind have occurred in the hospitals, particularly in the Children's Hospital, as well as in Parisian private practice, and at various places in France. The existence of the affection has been pointed out in the reports made on the epidemics of pseudo-membranous sore throat which have prevailed in the departments. Within the last few months, I have shown you several examples in our wards: and Dr. E. Moynier has given an account of some others.[2]

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[1] Maingault:—De la Paralysie Diphthérique, Recherches Cliniques sur les Causes, la Nature, et le Traitement de Cette Affection. Paris, 1860.

[2] Moynier:—Compte Rendu publié par la *Gazette des Hôpitaux*, numéros des 15, 22 novembre et 1er décembre, 1859.

The great number of cases now observed, no doubt arises from cases not being allowed to pass unnoticed, in consequence of the zealous manner in which attention has been drawn to the affection: but they have also really been more common of late, a circumstance which is perhaps explained by diphtheria in recent years having assumed a peculiar physiognomy which it did not formerly possess, and which is characteristic of the toxic form of the disease. Be that as it may, there is not now a physician who has not heard of diphtheritic paralysis. Let me endeavour to give you a sketch of the principal features of the affection.

There are two distinct forms of diphtheritic paralysis, one of which is *severe* and the other *mild*. In the severe form, which, thank God, is very rare, the patients sink under adynamic and ataxic symptoms: in the mild form, generally speaking, recovery takes place, and in the exceptional cases in which death occurs, it is the result of an accident, depending it is true upon paralysis, but proving mortal from a mechanical cause, the patient, for instance, dying from the alimentary bolus having got impacted in the bronchus, as occurred in a case lately described by my friend and colleague, Dr. Tardieu.

In its mild form, diphtheritic paralysis has characteristics which I shall now point out.

Sometimes, paralysis of the veil of the palate supervenes towards the close of an attack of pseudo-membranous sore throat, before the complete recovery of the patient, as happened in the case of our female patient of bed No. 9 St. Bernard's ward; but generally, the period of its occurrence is after the disappearance of the false membrane, a week or a fortnight, or even a month after apparent recovery from a pharyngeal diphtheria. It declares itself by a nasal tone of the voice, such as might be attributed to destruction or great swelling of the palatine veil. The patient to whom I have referred spoke slowly, and articulated with difficulty. There was at the same time some dysphagia: fluids, which were swallowed with much more difficulty than solids, were in part rejected by the nose. When, however, the paralysis affects not only the veil of the palate, but also the muscles of the pharynx, there is greater difficulty in swallowing, and the passage of the alimentary bolus is difficult in proportion to the smallness of its volume; sometimes, it gets into the air-passages, where it produces consequences which I have just referred to, and to which I shall have to return. A peculiarity ob-

served in this class of patients by Dr. Maingault, and noticed in a work which he published anterior to the appearance of that of which I have just spoken,[1] and pointed out also by Dr. Duchenne of Boulogne —is that they can neither blow out a lighted candle, inflate the cheeks, suck, nor gargle. To explain, Gentlemen, the mechanism of the difficulty of swallowing, and of the different phenomena which I am going to point out to you, would carry me beyond the limits of a clinical lecture: this mechanism has been fully discussed by Dr. Maingault in his thesis.

Upon examining the pharynx of the patient, the veil of the palate is seen to be hanging down, in such a way as to half-close the posterior cavity of the mouth: in place of rising and falling as usual with a frequent oscillatory movement when the tongue is held down by a spoon, it remains almost immovable. It does not contract when an attempt is made to excite it by the point of a bistoury or pen: its sensibility, naturally so exquisite that its slightest titillation produces nausea, is completely blunted: it may, without causing any suffering, be pricked, or cauterised with hydrochloric acid or nitrate of silver.

The palatine veil is generally the part first affected with diphtheritic paralysis: this might be anticipated, for in addition to the general cause, there is in operation the local condition—the inflammation of which the pharynx, tonsils, uvula, and veil of the palate are the seat—which has an influence in producing the local paralysis. It is, indeed, a recognised fact, as I have already said, that inflammation when it invades a muscle, carries with it such a modification of the vital properties of that muscle, as to diminish or even destroy its contractility. Taking this fact alone into account, the explanation which I gave in 1851 of paralysis of the veil of the palate was admissible: but at that time I had only looked at one side of the question, and later observations showed me that the inflammation plays but a subordinate part, though undoubtedly it has a great predisposing influence in bringing the muscular structure under the operation of the general cause which produces diphtheritic paralysis in other parts of the body. So well, sometimes, and by no means rarely, is the principal part performed by this general cause, that the paralysis of the veil of the palate does not supervene till long after

[1] Maingault:—Sur la Paralysie du Voile du Palais à la suite d'Angine. [*Thèse de Paris*, 1854.]

recovery from the sore throat, at a time, therefore, when the inflammation being completely at an end, could no longer be an agent.

Not only is the veil of the palate generally the part which is first affected by diphtheritic paralysis; but it is also a part to which I have often seen the paralysis limited. Sometimes, the paralysis sets in all at once and in a general manner, attacking simultaneously, for instance, the veil of the palate, the limbs, and different organs; or perhaps the paralysis of the veil of the palate has only preceded by a few days the affections which we are now about to study; or finally, but this is a much less usual occurrence, the paralysis of the veil of the palate may have almost entirely passed away, when other parts become paralysed.

A circumstance which clearly shows that diphtheritic paralysis depends on a general cause, and that paralysis of the veil of the palate cannot be entirely explained by the plastic inflammation of which the veil was the seat, is, that paralysis may strike the palatine veil consecutively to cutaneous diphtheria, as well as consecutively to pseudo-membranous sore throat, as has been seen by my friends and colleagues Dr. Barthez, and Dr. N. Gueneau de Mussy, as also by myself in a recent case. This is a point of the greatest importance, for it demonstrates both the special character of the symptoms and the specificity of the nature of diphtheritic paralysis.

The case to which I refer occurred in a gentleman sent to me from Laval by my honourable colleague, Dr. Garreau. During last February, this patient took diphtheria, which was then epidemic in Laval. Two members of his family, a child and a servant, had taken the disease: in him, the seat of the pellicular affection was a surface on the front of the chest to which a blister had been applied, for the relief of angina pectoris from which he suffered much. Four or five days after the application, the vesicated surface ulcerated, and became covered with false membrane: the sore which was exceedingly painful took five weeks to cicatrise. During the month which followed, there was no sign of constitutional disturbance, the general health seemed unexceptionable, and the patient was getting ready to start for Croisic, when the symptoms supervened which led to my being consulted.

Without any discoverable cause, he began to experience slight difficulty in walking, and some diminution of the muscular power of the arms. He had also difficulty in swallowing, and complained of constantly having a sensation in the throat of the presence of a

bulky foreign body: food, especially fluid food, was swallowed with difficulty, and excited violent paroxysms of coughing. The sensibility of the skin was blunted, and there was formication in the feet, legs, and hands. The patient did not feel his toes come in contact with the sole of his shoe: he could scarcely hold his hat, put in a button, or carry a spoon to his mouth, indeed the mouth went to the spoon rather than the spoon to the mouth. Micturition and defecation were performed under the influence of the will, but the patient had almost no consciousness of the passage of the excrementitious matters. He had also dimness of vision—a considerable amount of amblyopia, which had sensibly diminished when I saw him in June. The paralytic symptoms had then, however, rather increased. The urine, treated by heat and nitric acid, gave no albuminous precipitate. There was no pain in any part of the body, and the mental faculties were not impaired in any degree.

The gentleman informed me that at the time he was suffering in the manner described, there were, to his knowledge, several persons at Laval who were similarly affected. Among other cases, he mentioned to me that of a workman, in whom the symptoms had supervened, as in his own case, after the application of a blister, and the vesicated surface becoming covered with false membrane.

Gentlemen, I beg you to observe, in corroboration of what I have said as to the secondary part which the inflammation of the throat plays in the production of the paralysis of the veil of the palate, that in the case which I have just described, that form of paralysis occurred though there had been no sore throat.

Generally, however, when the paralysis is consecutive to cutaneous diphtheria, it commences in the extremities.

The patients complain of numbness, and of formication extending from the fingers to the continuity of the limbs. The sensation of formication is most felt when the patients make a muscular effort: it is accompanied by a feeling of cold in the feet and hands, and of weight in the limbs. Their tactile sensibility is blunted, and sometimes the anæsthesia becomes complete: you may pinch them and prick them without occasioning pain. This anæsthesia may extend to the entire cutaneous surface; but usually, anæsthesia and analgesia exist only in certain parts of the body, precisely as in hysterical paralysis. The extremities seized are generally the inferior; and in some cases the patients either cannot feel at all or feel very imperfectly that on which they tread: they tell you that it seems as if

they were walking on cotton, or on a very thick woollen carpet. Some of them cannot walk without danger of falling unless their eyes are open. This is what is observed in other kinds of paralysis. When the hands become affected, the person loses the consciousness of holding anything in them, and is unable to seize small objects such as needles and pins. Paralysis of the nerves of sensation, I repeat, begins generally in the inferior extremities, whence it afterwards extends to other parts of the body; but cases have been noticed in which the superior extremities only were affected: in some altogether exceptional cases, hyperæsthesia occurs.

Along with the manifestations of paralysis of the nerves of sensation, paralysis of the motor power in different degrees also shows itself. The only sign of its presence may be the weakness which the patients exhibit, particularly when they try to walk rather quickly, or to go up or down a stair. But these symptoms do not remain thus limited: the feebleness goes on increasing, walking becomes more and more difficult, and at last, to stand is an impossibility: the individuals become bed-ridden: the paralysis may ultimately so increase as to make it impossible for the patients to raise their legs. By the aid of the dynamometer, the degree of the weakness of the superior extremities can to a certain extent be ascertained. You have seen that vigorous subjects, who when in their ordinary health ought to produce from 50 to 55 kilogrammes of pressure on Dr. Burq's dynamometer, are unable to show more than twenty, or perhaps not more than twelve or ten. The diminution of motor power goes on, till the patients are unable to extend their arms, which are in a state of constant tremor: the paralysis still increases, the power to use the hands is lost, and the individual requires to be fed by another's hand.

Like the affections of the sensory nervous system, those of the motor generally begin in, and sometimes remain limited to, the inferior extremities. In most cases, however, the superior extremities are attacked in their turn, and subsequently, the muscles of the trunk and neck may become affected. My friend, Dr. Faure, who was the first to point out the fact has accurately described it. "The general carriage of the body," says he, "has greatly altered: the whole of the upper part of the trunk is thrown back: the head, on the contrary, falls down in front on the chest; all the muscular masses of the neck and back are powerless: sometimes, the patients are unable to raise the head when asked to do so, and if the whole

body is turned backwards, the head immediately drops down like an inert mass." [1] The intercostal muscles and diaphragm are sometimes struck with this form of paralysis; and the great dyspnœa of our patient of No. 9 St. Bernard's ward, which for a short time alarmed us so much, had no other cause than this. In that woman, too, whose case presented a complete picture of all the symptoms we are now studying, you saw the muscles of the face, lips, and tongue become affected.

The appearance of persons with paralysis of the muscles of the trunk, and the embarrassed utterance which exists when the tongue and lips are implicated is similar to that of idiots; but the precision with which they reply when interrogated demonstrates the clearness of their mental faculties.

Mutability of symptoms is a peculiarity which seemed to have been first pointed out in the case of the little girl of four years of age whom I saw with Dr. Faure, of whom I have just been speaking to you, a peculiarity to which I call your attention, which I have often noted, and the presence of which, in the case which is the subject of the present lecture, you have had an opportunity of observing. Thus, you will see paralysis diminish in one limb, and simultaneously increase in another. The numbness, for example, which the patient has been experiencing in one leg, will suddenly cease, and become greater in the other leg: to-day, the right hand will not give a dynamometric pressure of more than 10 or 12 kilogrammes, and to-morrow its power will have augmented, while that of the left will have diminished: then the parts which were first affected are a second time attacked, and become more affected. This strange peculiarity, this mutability, does not exist in paralysis dependent upon a lesion of the nervous centres appreciable at the autopsy, but is met with in other diseases, particularly in hysteria: it is also seen in the paralysis consecutive to acute diseases, as has been pointed out by Dr. Gubler in a remarkable paper which was read before the Hospital's Medical Society.[2]

The muscles of organic life are not exempt from the influence of the disease: I have already stated that the diaphragm may be affected: the muscular coat of the intestine, particularly of the rectum,

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[1] *Union Médicale*, 3 February, 1857.

[2] Gubler: Des Paralysies dans leurs Rapports, avec les Maladies Aigues, etc. [*Archives Générales de Médecine*, 1860.]

is that most frequently implicated. There is, as a consequence, obstinate constipation, as I have often seen. In one of the cases reported by Dr. Sellerier, and communicated on the 18th September to the Medical Society of the department of the Seine, there was first retention and then incontinence of the fæces.

In some cases, the palsy strikes the bladder: there is dysuria, and vesical tenesmus: the individuals urinate from engorgement: when, on the contrary, the sphincter is paralysed, there is incontinence of urine.

Virile debility, amounting sometimes to complete anaphrodisia, exists in the majority of patients affected with diphtheritic paralysis, as I have ascertained by questioning them on the subject. Some of you will remember a young man, of whom I shall afterwards have to speak, who occupied bed No. 19 in St. Agnes's ward: loss of virile power was one of the first symptoms to which this patient called my attention. You can understand that in women it is difficult to ascertain the existence of anaphrodisia.

The senses of smell, taste, and hearing are affected in some cases, but the affection of special sensation which is most commonly met with is dimness of vision: my colleague Dr. Blache and I have met with numerous examples. On the 15th of June last, I was consulted in the case of a girl of nine years of age, who had been attended at Vichy, during an attack of pseudo-membranous sore throat, by my honourable colleague Dr. Alquié. In rather less than a fortnight after recovery from this malady, the tone of the child's voice was nasal, but the paralysis was limited to the veil of the palate; some time later, she experienced general debility, which attracted the notice of the parents from her not entering with her accustomed ardour into her usual games. She was brought into my consulting room, when I found that the feebleness was excessive. On trying her strength by Dr. Burq's dynamometer, I scarcely obtained a pressure of 3 or 4 kilogrammes: I also ascertained that she was presbyopic. In a few days, the patient's mother again called me in: the first remark she made was that her daughter could no longer see distant more distinctly than near objects, and that instead of placing the book far from her, she was now unable to read, unless she held it at two or three centimeters from her nose: the presbyopia had been succeeded by myopia.

Presbyopia and myopia are observed then in very many of those who have paralysis as a sequel of diphtheria. The most common of

these two indications of feebleness of sight is presbyopia. A child whom I sent to my friend Dr. Follin that he might make an examination of the eyes with the ophthalmoscope, could not read No. 10 of Jæger, that is to say, the sub-title of the *Moniteur des Hôpitaux*.

Feebleness of vision advances in some cases to complete blindness, which, however, ceases after a longer or shorter interval. This transient amaurosis is sometimes one of the first symptoms of diphtheritic paralysis.

Upon investigating these cases of temporary disturbance of the visual apparatus, we find that there is no appreciable structural change in the choroid membrane, the retina, or the centre of the eye. This is the conclusion arrived at by Dr. Follin, whose great experience and talent shown in the solution of the problem now before us, is known to all of you. Dr. Follin believes that the impaired vision depends upon paralysis of certain muscles of the eye. You are aware of the part which many physiologists assign to the action of the internal muscles of the eye in accommodating the organ to different distances: if this theory, by many considered very open to objection, be accepted, paralysis of some of these muscles would occasion a defect in the accommodating power, and lead according to circumstances, either to presbyopia or myopia. Whether the internal muscles of the eye do or do not play the part thus assigned to them, in producing those visual affections of diphtheritic patients of which I have been speaking, another explanation than that now stated can be given of the amaurosis and amblyopia. Recollect how common it is for albuminuria to be coincident with diphtheritic paralysis: recollect that although you do not always find albumen in the urine of diphtheritic patients with visual affections, you do find it as a rule: moreover, I need not remind you that amaurosis, amblyopia, and presbyopia are not unusual concomitants of albuminuria. It is allowable, therefore, to believe that in some cases belonging to the class now before us, the existence of albuminuria ought to be taken into account, and that everything must not be ascribed to paralysis of the muscles of the eye.

The existence of paralysis of the muscles of the eye is nevertheless beyond question: on it depends the fall of the eyelid, and the strabismus so frequently met with, which when present in one eye only produces double vision.

All the affections of which I have been speaking—paralysis of the

veil of the palate, of the extremities, of the muscles of the trunk, and face, as well as the impaired vision—continue for a certain time, but at last completely cease. Death, however, as I have been careful to tell you, even when the diphtheritic palsy has assumed the mild form, may result from intercurrent complications. I have already alluded to the case observed by my friend Dr. Tardieu, my colleague at the Lariboisière Hospital, and published by his pupil M. Rocher in the *Union Médicale* for 1st October, 1859. In that case, death arose from asphyxia following the passage into the left bronchus of the alimentary bolus. Dr. Peter mentions in his memoir a similar case in a child of eight years of age.

Perhaps there is reason for astonishment that such accidents are not more common, when we see how frequently there is difficulty of deglutition in patients affected with diphtheritic paralysis. Our patient of St. Bernard's ward escaped being a victim to this terrible complication; but you recollect that it was necessary for some time to take very great precautions in respect of his taking food. Notwithstanding these precautions, we had on several occasions to encounter suffocative attacks from the aliments, solid and liquid, having a tendency to get into the air passages.

When diphtheritic paralysis assumes the *severe form*, regarding which I am now going to speak, the termination is fatal: death supervenes in the midst of terrible nervous symptoms, against which the resources of medicine are impotent.

You have observed a case of this description in St. Agnes's ward. The patient was a man of twenty-five years of age, who, on admission, stated that he had been ill for four days. I found that he had pseudo-membranous pharyngeal sore throat, which seemed to be on the way towards recovery on the twelfth day from that on which he was admitted to the hospital. When alarmed at the persistence of albuminuria, a paralytic affection of the veil of the palate supervened. Forty-eight hours later, the inferior extremities were affected: great weakness made walking difficult: and at the same time, there were observed loss of appetite, dysphagia, and the reappearance of a white spot on the throat. Nine days later, there was a very large quantity of albumen in the urine, and the legs were œdematous. Respiration was considerably oppressed, and I detected œdema of the lungs. The debility went on increasing; and the patient died twenty days after the beginning of the paralytic symptoms, and a month after his arrival at the Hôtel-Dieu.

I was asked, four months ago, by Dr. Surbled of Corbeil to see a man of 52 years of age who had contracted diphtheria from one of the members of his family. After having been ill for eight days, he seemed to have recovered, when he began to have a nasal voice, and to experience some difficulty in swallowing. His inferior extremities soon became feeble: this feebleness went on increasing, and the superior extremities in their turn became similarly affected. The motor paralysis was accompanied by numbness and formication, and was followed by an affection of the breathing: when I saw the man, he had considerable dyspnœa. The symptoms went on increasing in severity till death took place three months from the date of the commencement of his diphtheritic sore throat.

The little girl whom I saw in 1848 with Dr. Dewulf likewise died from this severe form of diphtheritic paralysis; she was carried off by cerebral symptoms, the nature of which I misunderstood at the time of their occurrence, for I then attributed them to a tubercular lesion of the encephalon.

The following case, reported by Dr. Millard, is very remarkable. A little girl of nine years of age was admitted, on 22nd March, to the Children's Hospital, Rue de Sèvres. Consequent upon an attack of membranous sore throat, which had commenced six weeks previously, and had continued for ten days, she retained a very nasal tone of voice, and some dysphagia, particularly a difficulty in swallowing liquids, which returned by the nose. General debility made it painful for her to walk or stand, and imparted a character of uncertainty to her movements. She remarked to her mother that her sight had become so indistinct that she was no longer able to thread a needle. She was in low spirits, and had little appetite. There was neither diarrhœa nor fever; but for eight days, she had had a little cough.

On the 23rd March, the alteration in the voice was verified: on causing the child to open the mouth by telling her to pronounce the exclamation—*ah!* it was observed that the veil of the palate remained completely immoveable. It still, however, retained its sensibility, but on tickling the uvula, nausea was excited. Sight was sensibly enfeebled, and the pupils were small and contracted. Objects held out to her, she grasped slackly, and easily allowed them to escape from her grasp. Her uncertain, tottering step suggested the idea of incomplete paraplegia. There was no change in the general sensibility. The urine did not contain albumen.

For the first two days of her residence in hospital, she was moping, without appetite, and without energy: afterwards, when she became accustomed to her new abode, she went into the garden, and regained her spirits and some strength. There was, however, no improvement in respect of the paralysis of the veil of the palate. She was put on a tonic regimen, and took daily a gramme [15½ grains] of extract of cinchona in infusion of coffee.

On 28th March, she went to mass in the morning, breakfasted with appetite, and received a visit from her relations: when they left her, they were enchanted with her improved condition. She went to vespers with her companions, when, at 4 o'clock, she was seized with cerebral symptoms, which at first gave rise to the belief that she had fainted: she sunk down, without cry or convulsion, the countenance at the same time becoming altered. Dr. Millard saw her at five o'clock. She was then lying on her back: the face was flushed, the skin was hot, and the pulse, 128: she complained of intense headache. The mental faculties were not impaired. There existed neither contractions, convulsions, nor paralysis: but there was strabismus, and a persistence of the nasal tone of voice. There was a deep sonorous cough, without any sign of pulmonary lesion appreciable by auscultation or percussion. From the previous evening, it was noted, that she had been constipated. Being in doubt as to the diagnosis, Dr. Millard ordered the hair, which was profuse, to be cut immediately, four leeches to be applied behind the ears, a purgative enema to be administered, and sinapisms to be shifted about over the surface of the lower limbs. During the evening, general convulsions supervened: the child uttered piercing cries, and passed a restless night. The leeches had bled to the extent that was desired, and the result of the enema was an abundant evacuation.

At the visit next morning, the visage was pale, and the pulse, which remained at 128, was a little compressible, and less resistant than on the previous evening. The pupils were naturally dilated, and the weakness of vision and strabismus continued to be very decided. The patient complained of pain in the head. Intelligence remained unaffected. The breathing was oppressed and sighing, without there being any appreciable sign of pulmonary lesion. Calomel combined with scammony was prescribed: forty centigrammes [7⅗ grains] of calomel and ten grammes [nearly 155 grains] of scammony were ordered to be mixed and divided into five equal parts, one of which she was to take every hour. At four in the afternoon, the child was

in the agonies of death, and in an hour expired, without having had convulsion or contorsion, the intelligence remaining clear to the last.

No organic lesion of any consequence was observed at the autopsy, except congestion at the base of the lungs, and in the left lung two tubercles each of the size of a filbert nut.

Thus, Gentlemen, the affection of the respiration, such as we observe in malignant fevers, the vomiting, the delirium, the convulsions, the ataxo-adynamic phenomena, and the general exhaustion, are the symptoms amid which persons sink under the *severe form* of diphtheritic paralysis, symptoms which bear witness to the malignity of the disease by which they are stricken, and which acts upon the essential powers of life.

The absence of albumen in the urine of the patient whose case I have just detailed is a circumstance possessed of some interest. I have told you that albuminuria ought to be taken into account in considering the causes which produce the disorders of the nervous system as manifested in the visual apparatus, in muscular paralysis, and convulsions, such as our patient of bed No. 9 had, or such as those of a more formidable character which occurred in the case of the little girl of Dr. Millard; yet in the latter case, there was no albuminuria to associate with the nervous phenomena. Physicians who have made this subject a matter of special inquiry, Dr. Maingault in particular, have come to the conclusion that diphtheritic paralysis may supervene in patients who have not had albuminuria at any stage of their diphtheria, as in Dr. Millard's case, and in that of our female patient in St. Bernard's ward. Although I have been in the habit of every day attentively examining the urine, and finding remarkable variations in the quantity of albumen which it contained, I have hardly ever perceived any coincidence between a diminution of albumen and the variations in the paralytic symptoms. Moreover, Dr. Maingault has justly remarked, that the nervous affections which occur in the course of Bright's disease are convulsive and comatose in their character, and bear no resemblance to those now under discussion. With the exception of amaurosis, so often met with in persons having albuminuria, no one has observed paralytic manifestations in Bright's disease.

Diphtheritic paralysis, then, does not depend on albuminuria; and it is still more deserving of notice, that it bears no relation to the intensity, extent, or continuance of the characteristic local mani-

festations of the disease. It is no doubt most commonly as a sequel to the severe form of diphtheria, to sore throat complicated with membranous coryza, to glandular engorgements of evil omen, and to plastic exudations on different parts of the body, that paralysis occurs; but on the other hand, it is by no means unusual, in the present day, for strange disorders of innervation to show themselves in persons who have had diphtheria in apparently its mildest form. Dr. Maingault has mentioned a certain number of cases of this kind—cases in which paralytic affections more or less general, and more or less persistent, followed pellicular disease stationed on the pharynx and occupying a very limited surface: in some of the cases it is true, the false membranes had obstinately resisted cauterization, but in the majority, they had quickly disappeared under that treatment.

Perhaps I have recalled to the recollection of some of you the history of the patient who occupied bed No. 9 of St. Agnes's ward, and who furnished us with an example of diphtheritic paralysis supervening after an exceedingly mild attack of pseudo-membranous sore throat. The patient was a man aged twenty-four years of age, of vigorous constitution, and by occupation a discharger of barges. A month before coming into our wards, he was seized, consequent upon a chill, with shivering, fever, and very acute sore throat. At first, he remained at home without any treatment, and then went to the Beaujon Hospital, where he was placed in Dr. Gubler's wards. My colleague, whose experience in a matter of this kind cannot be called in question by any one, diagnosed the case to be one of common membranous sore throat—guttural herpes. The urine, which was carefully examined, did not contain albumen. Recovery was rapid. Some days later, however, this man's voice was nasal, his deglutition was difficult; and if he drunk hurriedly, the fluid was returned through the nose. He nevertheless asked permission to leave the hospital, and resume his ordinary occupations. The paralysis of the veil of the palate continued, and he complained of a constant feeling of cold. Eight days afterwards, he experienced a sensation of painful numbness: on the following day, the left hand was seized, and in eight days more, the feet and hands were affected with paralysis: the progress of the disease was slow and uncertain. You recollect the condition in which we found him on his arrival at the Hôtel-Dieu, a month after the commencement of his attack of sore throat, that is, about three weeks after the appearance of the

paralytic symptoms. He tottered at every step, and did not feel the ground under his feet, so that to prevent himself from falling, he was obliged to look at his feet when he walked. He showed by the right hand a pressure of 20 kilogrammes on Dr. Burq's dynamometer, and by the left, 21 kilogrammes: a man of his age and of ordinary strength ought to show a pressure of 55 or 60 kilogrammes. I found that anæsthesia and analgesia existed on the entire surface of the body: the right side of the face was rigid: there was neither strabismus nor amblyopia: the mind was unimpaired. This individual told us that he had completely lost venereal desire and had had no erections for a month. The functions of the bladder and rectum were regularly performed. Digestion was not at fault. I instituted tonic treatment, and gave iron and quinine. At a later period, I prescribed syrup of the sulphate of strychnia, and afterwards returned to the ferruginous medicines. When the patient, in accordance with his own wish, left our wards, after a residence of about two months, he had obviously regained some strength: on the evening before he went home, he produced, by the dynamometer, a pressure of between 32 and 34 kilogrammes.

Here then, we had a case of sore throat presenting all the appearances of guttural herpes, which led to paralytic symptoms, absolutely similar to those which supervene as sequelæ of the most severe diphtheria. But the question may be raised:—was this a case of real pharyngeal herpes? While it assumed the herpetic form, was it not under the same morbific influence which, at the same epoch, led to pure diphtheritic sore throat in other cases? Upon a former occasion I told you that the manifestations of diphtheria are exceedingly variable. Comparing that which takes place in this disease with that which takes place in small-pox, which is sometimes confluent and sometimes distinct, and which occasionally exhibits only one or two pustules—when we see what takes place in scarlatina, the specific eruption of which may be absent—we can quite well understand that the manifestations of diphtheria may be very different from one another, and yet the cause of the disease be the same—that while the morbific seed is the same, the produce varies with the soil in which it is sown. In illustration of this proposition, I quoted cases from Dr. Peter's work, which seem to prove the existence of this diversity of outward form in diphtheria.

If the sceptical can only see in this a coincidence, it must be admitted that the coincidence is at least a very remarkable one. Look-

ing to such cases, and to others of a similar description which I have quoted to you, we are entitled to ask, not only whether common membranous sore throats followed by paralytic affections—cases like that of our patient of bed No. 19 St. Agnes's ward—were not really diphtheritic sore throats; but also, whether sore throats of apparently the most simple character may not give rise to paralysis of the veil of the palate, as I lately observed in two cases? One of the patients to whom I refer was a man of 50 years of age, and the other a young girl of 15, a patient of my friend Dr. Léon Gros. Do not these cases of apparently simple sore throat originate in the same cause as severe diphtheria, especially when they occur during diphtheritic epidemics? If it be so, we can quite well understand how paralytic affections may supervene after simple, just as after diphtheritic sore throats.

I do not wish you, however, to believe that simple sore throats never bring in their train paralysis identical with that which occurs as a sequel to diphtheria. Facts accurately observed by able clinical physicians show that irrespective of the epidemic influence of diphtheria, simple inflammatory sore throats may be the starting point of that peculiar form of general paralysis which we have been studying; but while I admit this, I wish to state most positively that though it is very common to meet with paralysis as a sequel of diphtheria, it is exceedingly rare to see it following simple sore throat, which is perhaps the most common of all acute diseases.

It now remains for me to endeavour to interpret the facts which I have laid before you. *What is the nature of diphtheritic paralysis?* Can it be associated with any appreciable lesion of the nervous centres? Assuredly not. It would be inadmissible to suppose that upon a persistent anatomical lesion could depend symptoms so variable and mutable. We could not suppose it possible for such complete recovery to take place from these paralytic affections, if they depended upon softening, hæmorrhage, or any other organic affection of the brain or spinal cord. Autopsies have, besides, sufficiently cleared up this subject; and I have myself had opportunities of ascertaining after the death of the patients, that there was nothing appreciable in the state of the encephalon or spinal marrow or their envelopes, to explain the symptoms during life.

There takes place then in diphtheritic paralysis, something analogous to that which occurs in certain cachexiæ.

When we detect albuminuria in a diphtheritic patient, the first idea which suggests itself is to attribute to that condition the dis-

turbances of innervation which we met with. I will, Gentlemen, repeat to you a remark which I have just made, that on the one hand the nervous symptoms consecutive to diphtheria, except the indistinctness of vision also experienced by persons suffering from Bright's disease, the nervo-paralytic symptoms bear no resemblance to the convulsions and coma of uræmia: on the other hand, I again repeat, that in a large proportion of the cases of diphtheritic paralysis, not the slightest trace of albumen can be detected in the urine at any stage of the disease. We must, therefore, seek elsewhere for our interpretation.

Graves (in his clinical lectures) wishing to point out the relations which exist between different diseases, mentions numerous well known facts which present a great analogy to those we are now studying. He states that an entire crew after eating of a species of conger eel, were seized with nervous symptoms similar to those induced by lead poisoning. Some men died in a state of violent delirium: those who survived were affected with general paralysis. In some cases, the affection was permanent: in others, recovery took place at the end of three or four months. Three or four months! mark well the duration, for it is absolutely the same as that of diphtheritic paralysis. Werloff, and Forster speak of paralytic affections following maladies caused by eating some other kinds of fish.

Cases similar in their nature to these now mentioned are not rare in pathology. When lecturing upon urticaria, I stated that paralytic affections sometimes supervene in persons attacked by *febris urticata*.[1] They are observed still more frequently as sequelæ of other diseases. In syphilis, irrespective of paralysis depending upon specific tumours of the encephalon and spinal cord, and osseous growths of the cranium and vertebral canal, there occur other paralytic affections which cannot be traced to any appreciable lesion. The correctness of this statement is proved by the case of a man who is now lying in bed No. 22 of St. Agnes's ward. This individual, who is suffering from constitutional syphilis of old standing, complains of numbness, formication, weakness, and a feeling of excessive cold in the right leg to which these symptoms are confined: there is nothing abnormal in the state of the arm, face, or any part of the right side, except the leg.

[1] See p. 285 of this volume.

But it is still more usual for these paralytic affections to occur as sequelæ of severe fevers. You remember, Gentlemen, a woman who lay in bed No. 29 of St. Bernard's ward, who, two years ago, became paraplegic consequent upon an attack of small-pox. Such occurrences are frequent after that exanthematous fever. The rachialgia which announces the beginning of the attack, as well as the paralysis of the inferior extremities, and the retention of urine which accompany the lumbar pains, are, as I formerly argued, phenomena of this same class. The paralytic symptoms which manifest themselves after the termination of the eruptive fever are likewise referable to a similar cause.

Some of you, Gentlemen, I doubt not, still recollect the two patients of St. Bernard's ward who, consequent on typhoid fever, were struck with paraplegia. In one of my lectures on dothinenteria, I called your attention to paralytic cases of this description, when speaking of the disorders of the nervous system which may impede the progress of convalescence from that fever. I stated to you that these paralytic affections, which sometimes become general, involving the nerves of motion and sensation, attack the organs of seeing and hearing—the patients being blind and deaf—and also localise themselves in the inferior extremities, the bladder, and rectum. There is a remarkable similarity between such complications of dothinenteria and those observed in diphtheria: the similarity is all the more striking from the circumstance that the paralysis consequent on dothinenteria sometimes affects the veil of the palate.

Paralytic seizures also supervene during the course of, and after recovery from, typhus and cholera; and in a word, in connection with diseases which lead to serious disturbance of the organism and greatly shatter the nervous system. Clinical experience shows us that we can only regard as secondary causes of these seizures the prolonged suffering of the patient, the state of debility and anæmia into which he has fallen, whether as the result of the fever itself, or of exhaustion from hæmorrhages and profuse fluxes, or from having been condemned to a rigorously low diet; and that they must be looked upon as direct consequences of a morbific cause. They arise from an organic and functional modification imparted to the entire nervous system by this morbific cause, which having acted primarily and directly, acts during the whole continuance, and even after the cessation of the malady.

Here then, Gentlemen, we have to do with poisons as in the cases

cited by Graves: we have also to do with contagion-germs which produce symptoms analogous to, but not identical with those we observe in diphtheritic paralysis. Similar effects follow the taking of mineral poisons.

When I come to lecture on *specificity*, I shall remind you that poisoning with lead also produces disturbing effects on the innervation, and that among them paralysis occupies an important place: I shall describe to you the symptoms experienced by persons employed in manufactories of vulcanised caoutchouc: I shall speak to you of the effects of inhaling sulphuret of carbon, and among the symptoms produced by that substance, which have been so admirably described by Dr. A. Delpech, (the first to make them known to us,) I shall call your attention to diminution of muscular power, partial paraplegia, dimness of sight and dulness of hearing—in a word to various forms of paralysis.[1]

Well then! diphtheritic paralysis belongs to the same category: its real cause is poisoning of the system by the morbific principle which generates the malady on which the paralysis depends;—it originates in disturbance of the nervous system, in the modality to which it is subjected, a modality with which we are at present unacquainted, and with the nature of which we shall always, perhaps, remain in ignorance.

It would be difficult to formulate the *treatment* of diphtheritic paralysis. In general terms, I may say that tonic, strengthening remedies are everything. You, therefore, see me prescribe cinchona in all its forms, also various bitters and ferruginous medicines: you see me insist on the necessity of a substantial and restorative diet. According to the case I have to treat, I stimulate the functions of the skin by using aromatic lotions, dry frictions, or sulphurous baths. When the symptoms are on the wane, preparations of nux vomica have seemed to me to be of real service, by supplying, at the proper time, an excitant of muscular contractility. Sea-water baths are also indicated as a means of inducing perfect convalescence; and I believe that a well-regulated application of hydropathy might prove exceedingly useful for the same purpose.

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[1] Delpech:—Mémoire sur les Accidents que développe chez les Ouvriers en Caoutchouc l'Inhalation du Sulfure de Carbone en Vapeur. Paris, 1856.

Nouvelles Recherches sur l'Intoxication Spéciale que détermine le Sulfure de Carbone. [*Annales d'Hygiène. Paris*, 1863.]

Treatment of Diphtheria and Croup.

The Antiphlogistic Treatment ought to be absolutely rejected.—Alterative Treatment: Mercurials useful as Topical Agents: their inconveniencies: alcalies, particularly bicarbonate of soda, of very doubtful benefit.—Chlorate of Potash useful in cases of average severity.—Emetic Treatment: its Inconveniences greater than its Advantages.—Serious Consequences produced by Blisters.—Topical Method of Treatment by Astringents and Caustics is Best Treatment of Diphtheritic Affections.—Catheterism of the Larynx.—Indispensable Necessity of sustaining the vital powers of the patients by Food and Tonic Medicines.

Gentlemen:—When it became universally admitted by physicians, that pellicular affections were of the nature of inflammation, when croup was regarded as the result of inflammation of the mucous membrane of the larynx, it seemed, at the first view of the matter, to be both rational and easy, to extinguish in its site that inflammation, in general of very limited extent. Certainly, if we only take into account the local lesion, a diphtheritic patch on the skin, even though it cover the surface to which a large blister has been applied, is apparently of trifling importance: when we examine the throat of a person attacked by pseudo-membranous disease, we find that the swelling of the tonsils is very moderate, and the plastic exudation at first very limited in extent. No doubt, it might be supposed that a local disease so circumscribed, and giving rise, in the first instance, to so insignificant an amount of febrile reaction would readily yield to a pretty energetic *antiphlogistic* treatment, as other less extensive and less intense inflammations do not resist such measures.

Local bleeding by leeches and cupping, as well as general bleeding, seem therefore to be indicated as the appropriate means to be employed for the purpose of promptly subduing inflammations which set in with so peaceful an aspect. Here, theory has been found to be at fault, as it very often is when applied to practice. It cannot be doubted, Gentlemen, that cutaneous diphtheria, pseudo-membranous sore throat, and croup are inflammations: in common with all others, I accept that proposition as the truth: but I do not think that a dominating influence—the specific character of the inflammation—has been sufficiently taken into account. I shall tell you

when I come to speak of the very important question of specificity that septic maladies are personal maladies, over which the treatment which may be called physiological has generally little effect. The progress of the majority of this class of cases is unpropitious. When once the small-pox pustule is developed, whatever may be the degree of intensity in the accompanying inflammation, all the antiphlogistic resources of medicine will prove incapable of preventing it from running through its appointed stages: to arrest its progress, the pustule must be otherwise destroyed. To take an illustration from an affection which presents a striking analogy to that we are now studying:—when the malignant pustule is once developed, general bleeding, depletion by leeches or cupping, however often repeated, and however much blood is taken, have no effect in stopping its progress: on the contrary, they may do a great deal of mischief to the patient.

So it is in diphtheria. By the admission even of those who, taking a middle view, consider that in some cases antiphlogistic measures are useful, they never cure the disease. In my opinion, this modified belief of some physicians in the utility of antiphlogistic treatment is very open to be called in question. Nay, let me at once add, that a long experience has shown me that it is not only useless, but essentially injurious in septic diseases, which have an inherent tendency to produce prostration.

The remarks which I have made on the antiphlogistic, are equally applicable to the *alterative* treatment, which is in fact its adjunct. Mercury and its preparations occupy the first place among alterative medicines. Mercurials, as you are aware, are regarded as the most powerful antiphlogistics in the *materia medica*, and they are perhaps even more potent in that respect than bloodletting.[1] You have seen, a hundred times, the effects which we have obtained from them in inflammations of serous membranes: you are aware that in these affections, so very formidable from their extent, seat, and concomitant fever, their beneficial influence has been lauded. Well! mercurial preparations—calomel given internally, and cutaneous frictions with Neapolitan ointment[1]—have been tried in England, Germany, America, and France, as antiphlogistic remedies in the treatment of diphthe-

[1] The "*onguent Napolitain*," called also "*onguent mercuriel double*" is made by mixing with washed prepared lard an equal weight of pure mercury; and then triturating them together till the latter is killed, or in other words till the metal is so minutely divided that no globules can be seen. TRANSLATOR.

ritic affections, pseudo-membranous sore throat, and croup. The results, I must say, have often been successful. Without any other treatment, calomel administered at short intervals, in fractional doses, according to Dr. Law's plan, has cured a certain number of cases.

This announcement, Gentlemen, may seem a contradiction to my proposition in reference to the dangers of antiphlogistic treatment: and here it is that the question becomes very complex. In point of fact, calomel and the other mercurial preparations involve an argument which tells in two ways. Mercury has two modes of action: it has a general action on the economy, in which case it is an alterative medicine, an antiphlogistic: it has also an exclusively topical action. When you prescribe lotions for the skin of *eau phagédénique*, (a solution of corrosive sublimate,) when you irrigate the eye with mercurial collyria, when you apply to the eyelids red precipitate and protochloruret of mercury in the dry state or mixed with lard, when you fumigate with the red sulphuret of mercury, when you do any of these things, you institute a treatment essentially local; and it is only in an indirect manner that general results are obtained. The treatment which you employ is substitutive. It is only after the lapse of some time, and by perseverance in the treatment, that the mercury acts on the blood, and modifies its composition in the manner of alterative medicines. As a topical application, protochloride of mercury has seemed to me to be of real service in diphtheritic affections. When applied to the sores which are the seat of the pseudo-membranous exudations, it modifies their character in a beneficial manner; and if it has done good in pseudo-membranous sore throat, it is by its local action. When given to a patient with pharyngeal diphtheria in fractional doses—say 5 centigrammes [5 sevenths of a grain] mixed with 5 grammes of sugar [77½ grains] and divided into 20 packets, of which one is taken every hour—it mingles with the saliva, and in this state traverses the pharynx, touching the morbid surfaces, and modifying them in the same way that it modifies diphtheritic sores on the skin. I do not, however, dispute that this medicine may have a general action; for I know that it produces decided effects when absorbed in its passage through the alimentary canal: it modifies the blood, augmenting its fluidity, and so changing its state, that the secretions become less plastic. So far, indeed, am I from denying the constitutional action of this medicine, that I have a great dread of it; and I believe that the topical action is that

alone which is of use. When the treatment is restricted to frequent mercurial frictions, a special dyscrasia of the blood is speedily produced, phenomena depending on that dyscrasia occur, salivation is induced; but nevertheless, the diphtheria is not cured. It is not necessary to say more to show you that the mercurial treatment has its dangers from its constitutional effects. From its effects varying with the peculiarities of individuals, there is a risk of their passing the limits within which it is wished to restrain them; and in these circumstances the inconveniences of the antiphlogistic treatment are likely to be discovered, for if it do not at once aggravate the disease, it may prolong convalescence by increasing the debility into which the patient has been thrown by the disease.

I have now to speak to you of other alterative medicines. Some years ago, Dr. Marchal, of Calvi, published several cases, which seemed to prove that the bicarbonate of soda was useful in the treatment of diphtheria. He thus restored the reputation of the *alcaline* treatment, which, lauded for a time, had soon fallen into discredit, Both the external and internal use of the sub-carbonate of ammonia had been lauded by Rechou, but nevertheless this medicine so difficult, and sometimes so dangerous, to employ had been abandoned. Chamerlat prescribed gargles of hydrochlorate of ammonia, and Mourcmans has reported a case of pseudo-membranous laryngitis cured by bicarbonate of soda.[1] The alcaline treatment had become almost completely neglected, when Dr. Marchal restored it to credit. Other practitioners in their turn came forward to proclaim successes which they had obtained with it, some of which were real though purely accidental, while others were doubtful, or very open to be called in question. In this way, general attention was directed to the treatment of diphtheria by bicarbonate of soda, and by and by, enthusiasm mingling in the discussion, it was soon believed by some that in this medicine had been discovered a specific for diphtheria, and even for croup. Calm reflection, however, explained the marvellous results which were announced, and reduced them to their real value. In fact, it was easy to see that in the cases in which the alcalies were said to have cured pseudo-membranous affections, the cases were of that kind from which spontaneous recovery is usual, such as scarlatino-membranous affections, and such accidental membranous affections as occur during chronic diseases. This is of itself sufficient to

[1] *Encyclopédie des Sciences Médicales pour l'année*, 1839.

deprive the facts of their value. There is always something seductive in a theory: I myself put forth one when I wrote that there was ground for hoping that some advantage might be derived from the alterative and antiplastic action of bicarbonate of soda in modifying the general diathesis which seems to preside over the development of diphtheritic affections.[1] The general action of alcalies, the peculiar state of the blood which they produce, is an undoubted fact demonstrated by our predecessors—by Cullen among others; but this alcaline cachexy (for so it has been called) is not produced till the use of the alcalies has been long continued, and however protracted the duration of the diphtheritic attack, it never lasts long enough for the antiplastic influence of the alcaline treatment to come into operation. This treatment, far from producing the benefits which have been attributed to it, is the source of serious evils: it is open to the same objections as the alterative treatment, the dangers of which I have just been pointing out. The topical influence, however, of the bicarbonate of soda remains to be noticed: it has been thought that its solvent action assists in softening and detaching the false membrane. I was formerly a believer in this topical influence, and there are physicians who have still this faith, which additional experience has taught me to relinquish: the modifications induced in the diphtheritic secretions by alcaline solutions are far from being such as they seemed to me when first I made them the subject of observation.

Chlorate of potash, Gentlemen, is another medicine which has recently attracted much attention. This salt, discovered, as you are aware, by Berthollet, at the end of last century, entered the domain of therapeutics about the year 1796. In 1819, Chaussier proposed it as a remedy in croup. It had completely fallen into oblivion, when Dr. Blache, repeating the experiments made in 1847 by Hunt and West with this medicine in the treatment of gangrene of the mouth and pseudo-membranous stomatitis, was led to try it in the treatment of pseudo-membranous sore throat and croup. Dr. Isambert, when *interne* of Dr. Blache, studied with care and intelligence the numerous trials made with this medicine at the Children's Hospital, and made them the subject of his inaugural thesis.[2] The first results

[1] Trousseau et Pidoux:—Traité de Thérapeutique.

[2] Isambert:—Etudes Chimiques, Physiologiques, et Cliniques, sur l'Emploi Thérapeutique du Chlorate de Potasse, spécialement dans les Affections Diphthéritiques. Paris, 1856.

obtained in the treatment of membranous sore throat, though less satisfactory than in the treatment of ulcero-membranous stomatitis, were, nevertheless, encouraging. The chlorate of potash, no doubt, attained a vogue far beyond its merits, but the cases accumulated from all quarters justified its being regarded as capable of rendering some service in diphtheritic sore throat, though not entitling it to be looked on as a very efficacious remedy. With Dr. Isambert, I admit that the beneficial results obtained in cases of average severity are shown not only by real and ultimate success, but also by an action upon the mucous membrane of the pharynx, altogether special and in a certain sense elective, an action analogous to that which is observed in pseudo-membranous stomatitis; but I deny that it does any good in cases of severer type. When such cases have been treated solely by it, I have always observed failure; but when employed conjointly with other measures, its operation has appeared to me to be beneficial, though I cannot make an absolute affirmation to that effect. This remark applies to pseudo-membranous sore throat, but is still more applicable to pseudo-membranous laryngitis. No doubt, from time to time recoveries occur in cases of croup treated by chlorate of potash; but these cases are in no respect conclusive, as its use in them has generally been combined with other measures, particularly with emetics, to which solely the cure may sometimes be ascribed. As, however, this drug is supposed to have a general influence on the system, and to prevent plastic exudation, and as its employment does not induce bad consequences like those caused by alcalies and mercurials, there is no reason why it should not be given in obstinate cases. You must not, however, too much rely on its virtues, and you must not employ it to the exclusion of other treatment of established efficacy within certain limits.

I ought also to mention the treatment by *bromide of potassium* employed in doses of from 5 to 10 centigrammes; and by *bromine*, a medicine by the use of which Dr. Ozanam states that he has obtained the most remarkable success.[1] In consideration of the brilliant results announced by the inventor of this treatment, and also taking into account that he follows a different system of treatment from that which I pursue, and one which inspires distrust, it is necessary to maintain a prudent reserve. As the treatment of pseudo-membranous

[1] Ozanam:—Mémoire sur l'Action Curative et Prophylactique du Brôme contre les Affections Pseudo-membraneuses. 8vo. Paris, 1859.

affections is everywhere being experimentally investigated on a large scale, there is nothing to prevent trials being made with bromine as well as with other drugs.

Bromine and its compounds are not the only substances to which a certain amount of specific virtue has been attributed. You will recollect that the *sulphuret of potassa* was warmly recommended by Lobstein, and Professor Fritz of Magebourg, in cases, however, in which the diagnosis was doubtful; and it was also vaunted by Dr. Maunoir of Geneva; and subsequently, mention was made of it by Drs. Rilliet and Barthez.[1] It is not now employed. The same may be said of *polygala senega*, which at one time enjoyed likewise a great reputation, but which, owing its good effects to emetic and purgative properties, must be placed along with the therapeutic agents of that class, regarding which I have forthwith to address you.

But before I proceed to do so, I wish to mention an excellent medicine, recommended by Dr. Trideau (of Andouillé) a distinguished practitioner of Mayenne.[2] This physician comparing diphtheritic with catarrhal affections, and trusting in the latter to the good effects of balsamic medicines, had in the first instance the idea of employing *copaiba*, and afterwards *cubebs*, in a dreadful epidemic of diphtheria, raging in the department of Mayenne: by using these medicines, he obtained numerous recoveries. Copaiba has the disadvantage of disturbing the stomach, but cubebs rather increases the appetite, and ought, for that reason, to be preferred. I have had occasion to recommend the cubebs treatment, and to it I owe rather remarkable success—particularly in a case I attended with Dr. Peter of a lady whose grand-daughter was treated by homœopathy, and died of croup. The lady, who had, in addition to pharyngeal diphtheria, a commencement of pseudo-membranous coryza, recovered from all the diphtheritic symptoms in five days. The following is the treatment which I recommend. I order a packet of four grammes [62 grains] of the powder of cubebs to be taken in unleavened bread every four hours; and at the same time I direct that every half hour lemon juice be applied to the throat by means of a camel's hair pencil. I associate with the sort of substitutive action of the cubebs, the topical action of a vegetable acid, which is certainly not very energetic; but its feebleness is compensated for by frequency of application. As

[1] Rilliet et Barthez:—Traité des Maladies des Enfants.

[2] Trideau:—Nouveau Traitement de l'Angine Couenneuse, du Croup, et des Autres Localisations de la Diphthérie. Paris, 1866.

a good substitute for the powdered cubebs may be used the capsules of the extract of cubebs. Each capsule contains equal to seven and a half grammes [about 108 grains] of the pepper. In children Dr. Trideau recommends the use of a syrup of cubebs composed of 12 grammes [186 grains] of powdered cubebs and 240 grammes [between 5 and 6 ounces] of simple syrup. A teaspoonful of this syrup is given every two hours. On the third or fourth day of the treatment, there generally appears a scarlatinous exanthem, which usually coincides with the disappearance of the false membrane.

I now come to speak of the treatment in cases of pseudo-membranous sore throat and of croup, which I call treatment by indirect agents—by emetics and revulsives.

Emetics have been and are still regarded by a large number of physicians as among the most powerful remedies in croup. If laryngismus stridulus, or false croup, be included under that name, emetics are of unquestionable utility; and for reasons regarding which I wish to say a few words.

Whatever may be the special properties of the emetic you administer, whether it be veratrum album, violet root, asarum root, or the polygala which I have just mentioned—whether it be sulphate of zinc, sulphate of copper, or tartar emetic—in addition to the vomitive action—you will get an antiphlogistic effect. If vomiting be excited by other than pharmaceutical means, this same result will be obtained. There will be induced nausea, that peculiar state of discomfort which precedes the rejection of the contents of the stomach. The pulse becomes small and frequent, and the heart beats very feebly: the countenance becomes exceedingly pale: the body is bathed in sweat. In a word, the patient is thrown into a state analogous to lipothymia, the duration of which may be considerable: there occurs though in a less degree, something similar to that which follows bloodletting in some persons. You will thus perceive how it is that by a disturbance of the system affecting chiefly the nervous system, there is produced a contra-stimulant impression sufficient to extinguish slight inflammation.

Now, in false croup, the inflammatory element, under the influence of which is developed the spasmodic element leading to the fits of suffocative cough, which it is our object to subdue, this inflammatory element, I say, not in general going beyond what may be called a slight inflammation, we can conceive the utility of emetics; but the aspect of affairs is very different when we have to do with a

pseudo-membranous laryngitis—we cannot then count on the contra-stimulant effect of the emetic treatment, but only on the mechanical action. Let me explain.

Every one who has had to treat children in croup must have seen cases in which there was a great amelioration of the symptoms consequent upon the administration of an emetic: this change for the better, as is easily perceived, depends on the efforts of vomiting having caused expulsion of the false membranes which lined the larynx and trachea, rendering respiration easier, by removing the obstacle which they presented to the passage of air through the lungs. As to the dynamic action of emetics, to which some practitioners attribute the benefit which they produce, it can only exert an influence upon the inflammation in which the false membranes originate, and it is impossible to grant that it can produce any influence whatever on the exudations which have been already formed. Those who wish to see in the emetic treatment, and particularly in the employment of tartarised antimony, of which they speak in the highest terms of praise, a dynamic action, in which I do not believe, tacitly admit that that action is much less real than they say it is, and that its mechanical action is much more efficacious. In point of fact, they insist on the necessity of exciting vomiting; and their statistics show that the patients have no chance of recovery, unless they have thrown off false membranes.

I advise you to read the remarks of Valleix on this subject:[1] you will then see that he and I have come to the same conclusions in respect of this question. The action of emetics then, is mechanical: it is by clearing the air passages of the plastic deposits, that they prove of service. The advantages derived from this treatment must not, however, be exaggerated. When I resort to it in the hope of obtaining the good effects which one is entitled to expect, I am aware that these effects are transient. I know that diphtheria is a disease in which the inflammation giving rise to the false membranes will last for a limited time, that it will continue after the first secreted false membranes have been expelled, and give rise to the formation of others in their place. Now, if by a repetition of the same treatment, if by causing the false membranes to be expelled as soon as

[1] Valleix:—Guide du Médicin Practicien 5me édition, revue par Lorain, T. ii, p. 111. Paris, 1866.

formed, I prevent death from asphyxia, although I do not by direct means accomplish a cure of the malady, I carry out a useful treatment inasmuch as by prolonging the life of the patient whilst the diphtheria is running through its stages, the time may come when, that inflammation having reached its natural termination, the recovery of the patient will take place.

The selection of the particular emetics to be employed is not a matter of indifference. Tartar emetic, so lauded by some, seems to me to be the most dangerous of all emetics. Dr. Millard, in his excellent thesis has very properly insisted upon the drawbacks to its employment.[1] In point of fact, it often causes formidable symptoms, such as obstinate vomiting and choleriform diarrhœa. It causes extreme prostration, and often accelerates death. The dangers which I enumerate, experience has now sufficiently pointed out. Sulphate of copper, however, does not deserve the reproaches directed against it; and I often have recourse to it. Administered according to the method which I employ, that is to say in minutely divided doses, it is easier to avoid producing effects in excess of those desired.

But whatever utility may, under certain circumstances, attach to the emetic treatment, too much reliance must not be placed in it. After a long career of practice, after having seen a great number of persons, children and adults, suffering from diphtheritic sore throat, I can testify, that the failures have been much more numerous than the successes obtained by this treatment. Recollect that after you have administered an emetic, and obtained a decided beneficial result from it, the symptoms which have been suspended will again show themselves: often, within a very brief space of time, the oppressed breathing, and the suffocative fits from which you have relieved the patient, will return, in consequence of new false membrane having been secreted. If you should a second time be fortunate enough to cause their expulsion, the third time you employ the same measures they will prove a failure; you must, therefore, take care not to induce nausea too frequently, lest you induce such a degree of weakness, as will leave the patient without sufficient strength to contend against the disease, when it has become necessary to have recourse to tracheotomy.

Graves, in his 'Clinical Lectures,' speaks strongly in favour of the

[1] Millard:—De la Trachéotomie dans le cas de Croup, Observations Recueillies à l'Hôpital des Enfants Malades. Paris, 1858.

revulsive treatment of croup, but his statements evidently apply to cases of laryngismus stridulus: the method extolled by the eminent clinical professor of Dublin is no doubt very useful in false croup: I have already explained it to you, when lecturing on the complications of measles. I shall return to the subject when I come to speak of false croup; and I shall then tell you that there are circumstances in which blisters are useful, although they may be slower in acting than hot water, which Graves employed.

But when the disease we have to treat is real croup—when we have to do with laryngeal diphtheria—blisters are not only useless, but their application is too often productive of the most serious consequences. Reflect, and without difficulty you will easily understand how absurd it is—the expression is not too harsh—to expect any advantage in diphtheria from blisters. Supposing that the larynx is coated with false membrane, the condition in which it is generally found, for no one entertains the idea of applying a cantharides plaster till extinction of voice, dyspnœa, and paroxysmal respiration have supervened—supposing then, I say, that the false membrane is present in the larynx, it is not against the inflammatory condition in which plastic formations originate that we have to contend, but with a foreign body—for false membrane is really a foreign body—obstructing the passage of the air through the ramifications of the respiratory passages. What possible advantage can result from the use of revulsives and blisters, the action of which is essentially dynamic, against a lesion which is purely mechanical? It would be as useful to blister the neck of a child suffocated by the passage of a haricot bean into the windpipe. You would certainly call it madness in a surgeon so to act, under such circumstances; and yet the surgeon so acting would not be doing anything different from the physician who hopes to cure croup by cantharadine revulsives: there is, however, this immense difference between the two, that whereas in the case of the haricot bean the treatment would be useless, it can at least do no harm, while in a case of croup the results may be most disastrous. This is a point on which it is necessary to insist.

I have told you, Gentlemen, when giving you the history of diphtheria, that any wound, the very smallest solution of continuity in the skin, may become the seat of new manifestations of the disease in a patient attacked with plastic sore throat. I stated that it was enough that a child should have croup or pseudo-membranous

sore throat for diphtheria to be communicated to other members of the family, who, up to the time of their seizure were in perfect health, but had on some part of the body a solution of continuity to afford a door of entrance to the disease. You will see in children who have been blistered on the arms for catarrhal affections, a very common practice, and which may even have been resorted to by medical practitioners—you will see the blistered surfaces become covered with false membrane, if the children are living in the midst of diphtheritic contagion. Then, as I have already pointed out to you, the plastic affection extends beyond the denuded surfaces. I cited several cases, such, for example, as that reported by Dr. Samuel Bard, in which the diphtheritic disease, commencing in a surface to which a blister had been applied, gradually spread till it covered a large space, and induced symptoms which terminated in death. If such symptoms arise, in consequence of solutions of continuity, in persons not under the influence of the diphtheritic diathesis, they are all the more to be dreaded in those in whom manifestations of that diathesis have already shown themselves. I gave you the details of the case of a young man, who, just as his recovery from croup was completed, was attacked by cutaneous diphtheria, and was carried off by it in ten days. In that case, the cutaneous affection began in a blistered surface on the front of the neck, gradually extended, and at last covered the chest with false membrane, as if with an immense breastplate. The situation of the solution of continuity matters little : whether you apply a blister to the nape of the neck, or to the front of the neck or chest—wherever you have a surface denuded of epithelium—the pellicular affection may show itself, and become the cause of a complication difficult to contend against. During ten, twelve, fifteen days, or even longer, you will have to combat the disease by the most energetic cauterizations, and you may believe that you have mastered it, when symptoms of general poisoning of the system will appear, symptoms in short of that malignant form of diphtheria under which, do what you will, your patient will sink. Death, however, in these cases, does not always take place in this way : sometimes, in consequence of the extension of the diphtheritic inflammation, the surfaces invaded by diphtheria, after recovery from the principal disease has taken place, become the seat of very extensive suppuration, which may destroy the patients by an exhausting hectic fever. Gentlemen, I beseech you to adopt the rule of all true prac-

titioners, and never, under any pretext whatever, apply a blister to a patient who has plastic sore throat or croup. When called in to cases in which they have been applied, lose no time in employing energetic topical means to modify the character of the blistered surfaces.

Notwithstanding the opposition to topical treatment, at present existing, it is the preeminently best treatment of diphtheria: it is quite as much indicated in this disease as in malignant pustule: I have already insisted upon this capital point in practice. Besides red precipitate which I have sometimes employed, and the protochloride of mercury which I have already mentioned as a medicine possessing a certain power in modifying the action of surfaces invaded by pellicular disease, besides and superior to these mercurial preparations, astringents and caustic are the agents by which the topical treatment is best carried out. From time immemorial, local treatment has been employed. As Bretonneau has well remarked, at the period when the disease bore the name of the Egyptian disease, there was also an ointment called Egyptian, which was preeminently antidiphtheritic, viz. a *mel cupratum*, a mixture of verdigris and honey. Read the chapter of Arctæus entitled "*De Curatione Pestilentium in Faucibus Morborum*," and you will therein see that he not only recommends the application of acrid lotions—"*illitiones acriorum medicamentorum faciendæ sunt*"—but also recommends that the disease should be attacked, not by the actual cautery (the application of which he considered difficult) but with medicinal substances possessed of properties similar to fire:—"*porro igne vitium adurere, cum in superiori parte sit: imprudentis esse proper isthmum judico. Sed medicamentis igni similibus quo, et depastio coerceatur, et crustæ decidant, utendum præcipio.*" He prescribed a mixture of alum, powdered gall-nuts, and honey; likewise dried pomegranate flowers mixed with hydromel; and also calamine. He likewise insufflated powdered alum and gall-nuts into the throat by means of a tube.

You perceive, Gentlemen, that the means employed in the present day are far from constituting a new mode of treating diphtheritic sore throat. It is very remarkable that the efficacious treatment of Arctæus should so long have been forgotten. In the 17th and 18th centuries, when this form of sore throat reappeared in epidemic forms, when the suffocative malady, or Egyptian disease, made so many victims, nothing was heard of it. Bretonneau himself, who,

when he published his treatise on diphtheria, knew better than any other person what Aretæus had written about alum, had only a partial belief in its utility, and neglected to employ it. It was not till a later period that he had any confidence in it. The following are the circumstances under which he began to place some reliance in it.

I told him that during the epidemic in the departments constituting the old province of Sologne, I had had occasion to observe the efficacy of this medicament. In point of fact, I knew that in the *commune* of Marcilly-en-Vilette where at first 66 persons died in a population of 600, this frightful mortality suddenly diminished, and during the two or three following months there were very few victims. To get at the reason of this happy change, I visited the district. I there interrogated the parish priest, who was well acquainted with all that had taken place, and learned from him that the *white sore throat* had proved a less formidable scourge from the time that the patients had been attended by a woman who kept an inn in the locality, and who possessed a great reputation for curing diseases of the eye. The priest was ignorant of this woman's therapeutic secret. I then applied to the woman herself, but she refused to tell me, and contented herself by sending me to two patients upon whom at the time she was in attendance. One of them was a young lad, a journeyman miller, 13½ years old. I verified in him the presence of false membrane covering the uvula and tonsils. Some time previously, there had been three deaths in the family of this individual, who had been under treatment for five days: he showed me his gargle, which besides using as a gargle, he injected into the throat by means of a syringe. It was a solution of *alum* in vinegar and water. When I left the district, this young man had completely recovered. I collected several similar cases; and having discovered the secret of the landlady of the inn, I told her what it was. She then admitted that she employed alum, and stated that she had been led to use it as a remedy for the "white sore throat" because she had seen it cure aphthæ of the mouth [*chancre de la bouche*] in swine, a disease characterised by white pellicles on the gums and throat, and consequently presenting, as this good woman did not fail to observe, a certain resemblance to diphtheria. I communicated to the prefect of the department my documents, and an account of the cases which I had observed: the mode of treatment was forthwith printed, published, and sent to the

different *communes*. I at the same time mentioned what I had seen to Bretonneau, who in consequence of my statements employed alum: and at present it is used by all physicians in the treatment of diphtheria.

Tannin is another medicament mentioned by Aretæus in the passage I quoted; and it is one which you have seen me employ in all our cases of pseudo-membranous sore throat. Aretæus, it is true, does not mention tannin by name, because in his day the substance was not so known; but he speaks of powdered gall-nuts, which he prescribed to be used by insufflation, and in mouth-washes. Tannin and the gall-nut are the same thing, inasmuch as the former is the active principle of the latter. Alum and tannin in insufflations, mouth-washes, and gargles are powerful topical agents, and are of great service in the treatment of diphtheritic sore throat. Let me recall to your recollection the manner in which I employ them.

I follow exactly the plan of Aretæus. The alum is brought into contact with the lower part of the pharynx by insufflation through a straw, a piece of elder from which the pith has been extracted, or, if nothing else is at hand, a tube made of stiff paper. It is not necessary to be very exact as to the quantity of powder you employ, provided you employ enough: one gramme, two grammes, or more may be used. The only condition indispensably necessary for the proper application of the powder is that the tongue be very effectually held down during the insufflation. This detail, though apparently trivial, solicits our attention for a few minutes. It may appear an easy matter to depress a child's tongue whilst you examine the throat, yet I do not hesitate to say that few know how to perform that operation and proceed to an examination which is so much resisted by the little patients. However, by taking the precautions which I am now going to point out, it is easier to examine in opposition to the will of the individual the throat of a child than the throat of an adult, for in the one case it is impossible effectually to struggle with the patient, whereas, by management, in the case of the child, the end in view can be attained. First of all, you must let the child see that you are his master; and when he has seen that resistance is useless, he will cease to offer any. To accomplish this object, place him on the knees of an assistant, by whom he is to be firmly held: another person is directed to keep the head fixed in position. When the child struggles and cries, seize the opportunity

of his opening his mouth to introduce the handle of a spoon, pushing it back quite to the base of the tongue. As a consequence of this proceeding, the child, being seized with a desire to vomit, opens the mouth still more widely, and you are thus enabled to see to the very bottom of the throat. If, however, you only introduce half way the handle of the spoon, he will close his teeth upon it, and you will experience the greatest difficulty in pushing it farther on. One such examination successfully conducted will often be sufficient to enable other examinations to be made whenever they are required, as it will have shown the child that he has to do with a party stronger than himself. By proceeding in the manner now described, it will be easy to insufflate the alum, or to introduce a camel's hair pencil charged with a lotion or with honey in which the alum is mixed. It does not matter, I repeat, that the quantity is in excess, because no inconvenience results from the patient swallowing a little alum. The insufflations ought to be repeated from four to ten times in the twenty-four hours: it is necessary that they should be frequent in the early period of the disease.

To render the medication more powerful, the insufflations of alum ought to be alternated with insufflations of tannin. From forty to fifty centigrammes [$4\frac{3}{7}$—$5\frac{5}{7}$ grains] of the latter may be used. This is precisely the treatment of Aretæus, restored to favour by Dr. Loiseau of Montmartre.

I have recently, in adults, sometimes substituted for insufflations of tannin, the inhalation of the vapour of a strong watery solution of that substance, as adults inhale easily; and I employ in this operation the "*appareil pulvérisateur*" constructed in accordance with the suggestions of Dr. Sales-Girons. You are aware, Gentlemen, that that physician, struck by the fact that the vapour of a mineral water contained little or none of the saline mineral ingredients, conceived the idea of substituting for the inspiration of vapour, inhalations of the mineral water reduced to very fine powder. This is not the place to describe to you the means he adopted to accomplish this: I will only say that the surgical instrument makers have constructed, in accordance with his principle, a portable apparatus easily employed at the bed of the patient, and which you have seen in daily use in our wards. Drs. Roger and Peter have recommended *irrigation*, performed by the irrigator in common use. They say that "irrigation performed several times a day is physically and therapeutically beneficial by cooling the inflamed parts, and by like-

wise possessing the mechanical advantage of removing the false membranes, or at least assisting to detach them, and of thus cleaning the throat." It is even possible to dissolve a portion of the diphtheritic products by this process. At the Children's Hospital Dr. Roger has frequently caused the disintegration and almost complete disappearance of false membranes by placing them for five or ten minutes in a glass filled with a saturated solution of lime.[1]

In my opinion, and in the opinion of very many others, the treatment of pseudo-membranous sore throat by astringents is so useful, that if we could always be sure of our instructions being properly carried out, the catheretics and caustics to which you see me have recourse would be much less frequently employed.

The use of *catheretics* and *caustics* in diphtheria is nothing new, and they are mistaken who have supposed that it dates no farther back than Bretonneau: he never dreamed of appropriating to himself the credit of having originated this treatment. During last century, physicians were strongly in favour of cauterization with the spirit of salt, that is to say with hydrochloric acid, in the treatment of those affections which they designated gangrenous sore throats. Marteau de Granvilliers was said to have obtained great success from using it during epidemics of 1759 and 1768 of which he published accounts. Van Swieten, also, in several passages of his Commentaries on the Aphorisms of Boerhaave speaks of mouth-washes containing spirits of salt.

Hydrochloric acid is one of the most energetic topical agents at our disposal for the treatment of pseudo-membranous sore throat. Pure fuming acid may be employed without hesitation, and cauterization with it may be repeated three or four times in the twenty-four hours. Hydrochloric possesses the advantage over sulphuric and nitric acids of modifying the morbid surfaces without going any deeper into the tissue than nitrate of silver. It has, however, one drawback which I must point out to you, as it might sometimes mislead the practitioner. When a mucous membrane not covered with false membrane is touched with hydrochloric acid, a white spot is immediately formed presenting the exact appearance of a diphtheritic exudation. This plastic exudation is similar to that produced

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[1] Roger (Henri) et Peter (Michel):—Article, "Angine Diphthérique: Dictionnaire Encyclopédique des Sciences Médicales," T. V, p. 42.

by cantharadine and by ammonia; and it is not always easy to distinguish the morbid product of diphtheria from that caused by the acid, so that from not knowing whether the disease is cured, the treatment may be continued after it has ceased to be required. To avoid this inconvenience, it is better, after making three or four cauterizations during the first days of the malady to suspend the use of the caustic, substituting for it insufflations of alum and tannin. At the end of a period of twenty-four or thirty-six hours, the white spots produced by the hydrochloric acid will have disappeared, and it will be easy to see the exact condition of the parts.

Nitrate of silver, introduced into general use by Bretonneau thirty years ago, is more commonly employed than hydrochloric acid. The reason of this is obvious: every practitioner has lunar caustic in his pocket-case of instruments, while he has not hydrochloric acid always at hand. But the nitrate of silver has inconveniences similar to those possessed by the spirit of salt, and it has them in a higher degree, particularly if it is used in the solid form. A small slough is formed on the part touched by the solid nitrate, a sort of white pellicle which remains for one or two days: if the cauterization be often repeated, it is very difficult to avoid the mistake which I have just brought under your notice. Although I have long been aware of the risk of committing this error, I very recently fell into it, in the case of a man with sore throat, who came from Chantilly to consult me. I found one of the sides of the uvula and one of the tonsils covered with white false membrane: on the other tonsil there was also a spot presenting a similar appearance. The patient did not mention that anything had been done for him by his medical attendant, and even asserted that he had not been the subject of any treatment. He returned home, carrying with him a letter addressed by me to my honorable colleague at Chantilly, whose attention I directed to the thick false membranes which I had seen. I certainly added that these false membranes were not of a more than usually shining whiteness, but that as they were thick and occupied a large surface, I feared they were diphtheritic. I concluded by recommending the treatment which I thought ought to be adopted. Dr. D. in reply informed me, that the pseudo-membranous deposits were the results of cauterizations with nitrate of silver, performed for the purpose of causing abortion of an inflammatory sore throat for which the patient had consulted him.

When used in solution, nitrate of silver is without the drawback,

which I have pointed out as belonging to the salt in its solid form. Although the solution produces a whitish exudation it forms a superficial patch easily distinguishable from diphtheritic exudation. This remark is applicable to the strong solution I am in the habit of employing, which is in the proportion of three parts by weight of water to one of the salt. The solution has another advantage over the solid nitrate, besides that which I have now pointed out. Even when the cauterization is made with an instrument bent at the extremity in such a manner as to enable the operator to carry the caustic pencil behind the veil and behind the pillars of the veil of the palate, and to reach the vicinity of the epiglottis, cauterization with the caustic pencil as arranged for the pocket-case can never be brought into contact with all the affected surface, as can be accomplished when the solution is used. By fixing a sponge saturated with the caustic solution at the extremity of a piece of bent whalebone, the operator is enabled to touch the upper part of the larynx, and the posterior cavity of the pharynx—to reach even to the Eustachian tube and posterior aperture of the nasal fossæ, as is frequently necessary. When the disease is confined to the tonsils or other parts within view, the solid caustic or a badger's hair pencil will be found quite sufficient; but as it is often otherwise, or at least as there is often reason to fear that the diphtheria has invaded remoter parts, cauterization with the sponge is preferable. It is important to use a piece of whalebone having a certain curve. It ought to be round, and to possess rigidity sufficient to enable it to overcome the obstacles presented by the resistance of the patient and the contractions of the pharynx. A gun or pistol cleaning-rod, failing that, an umbrella whalebone will answer the purpose. Having rounded the whalebone, it is plunged in boiling water or exposed for some minutes to the flame of a candle, after which it is bent: it is then placed in cold water to restore its rigidity and cause it to preserve the curve imparted to it when in a warm and pliable state. Its extremity is then armed with a very small sponge secured by thread, or, better still, by sealing wax. To enable the cauterization to be conveniently performed, it is necessary to depress the tongue well, and firmly to retain it in that position by means of the tongue-depressor or the handle of a tin spoon bent almost at a right angle. The instrument by which the tongue is depressed must be introduced as far back as the insertion of the base of the tongue, elevating at the same time, as much as possible, the handle.

These details have their value: by neglecting them, there is not only a chance of not cauterising the affected parts, but likewise of needlessly cauterising parts which are not implicated in the malady. But by adopting all the precautions upon which I have now been insisting, nothing is simpler than to operate on the pharynx and reach the superior orifice of the larynx, which latter it is always necessary to accomplish, when the patient begins to cough, and to show symptoms of diphtheritic inflammation of the glottis; and it is equally easy to carry the cauterization back as far as the posterior orifice of the nasal fossæ. The sponge ought not to be too wet, lest thereby the tongue be injured and the teeth blackened. These consequences may not be very serious; but still, an unnecessarily extensive cauterization is painful, and ought, therefore, to be avoided: moreover, they are objectionable as liable to place new obstacles in the way of future necessary operations, by rendering the patients, if children, still more determined against submission. Another inconvenience attending the use of nitrate of silver is its property of indelibly staining linen, when the patients spit as they always do after the cauterization, or when they vomit, which is not an unusual occurrence. The avoidance of this staining is apparently an extra-scientific consideration, but still it is not without importance in practice.

Sulphate of copper, the action of which is quite as energetic as that of the nitrate of silver, has not the same drawbacks. It causes no membranous patches to appear on the surfaces which it touches: you, therefore, see me employ it by preference to the nitrate, the preparation I use being a saturated solution.

The actual cautery has likewise been employed by some physicians. Long ago, I saw it used; that is to say in 1828, during the Sologne epidemic, of which I have spoken to you. Dr. Bonsergent, an old practitioner at Romarantin, a town in Sologne, cauterised with the actual cautery the diphtheritic throats of children. The iron which he employed was the tool used by makers of wooden shoes in scooping out the *sabots;* he made one of its extremities red hot, and wrapped up the other in wet tow, or placed it between two pieces of wood to serve as a handle; and thus it was that he applied the actual cautery to diphtheritic tonsils. I had an opportunity of remarking to Dr. Bonsergent that this application of the red-hot iron was not free from danger—that there was a risk, from the want of docility in those operated on, of touching parts which ought not to

be touched, and of so producing deep and extensive sloughs of mouth, cheeks, or lips. To this objection my colleague replied, that my fears were groundless, and the dread of being burnt, which the patients themselves experienced, made them open the mouth wide enough to enable the operation to be performed with the greatest ease. I witnessed some successful results; but still there was nothing in these cases to make me a convert to the treatment by the actual cautery, which seemed to have too brutal an appearance, and to be a very dangerous proceeding, notwithstanding the opinion to the contrary held by my honourable colleague. The recent writings of Dr. Valentin have failed to reconcile me to the use of the actual cautery in diphtheritic sore throat. It is quite a different thing when the diphtheria is cutaneous, anal, or vulvar, or when the affection we have to treat is stomatitis of the gums or mouth. In such cases the actual cautery has seemed to me to be of real utility; and in such cases, you have pretty frequently seen me employ it.

In the treatment likewise of laryngeal diphtheria, cathartics and caustics, insufflation of powdered alum and tannin, cauterization with solution of nitrate of silver or sulphate of copper, and cauterization with hydrochloric acid may be employed.

A child, for example, begins to have a croupy cough, but as yet has not croup: false membranes have not yet been formed in the larynx: there is only an incipient diphtheritic inflammation, but before twenty-four or forty-eight hours have passed, the formation of false membrane will have taken place. Under such circumstances, therefore, the indication is to prevent their formation, by modifying the inflammation in which they originate; and this is to be done by applying cathereties to the superior orifice of the larynx, and to the larynx itself.

The following method has been practised by Bretonneau and me. We charge a tube with powdered alum, and introduce it far down into the patient's throat: after making him depress the tongue in a suitable manner, the insufflation is performed and repeated several times in rapid succession. By acting thus, a time comes when the patient is forced to draw in a full breath, and with it some of the alum necessarily passes into the respiratory passages. To accomplish cauterization with hydrochloric acid, nitrate of silver, or sulphate of copper, it is sufficient to introduce behind the epiglottis a sponge soaked in the fluid caustic; once the sponge has been brought into contact with the aryteno-epiglottidean ligaments,

it ought to be pressed against them in such a way as to squeeze out a little of the fluid caustic: the presence of the sponge excites convulsive inspiration, by which means the medicinal agent is made to enter the larynx. It must be admitted that these therapeutic measures are very imperfect, and lead to very uncertain results.

Inhalations of the vapour of hydrochloric acid, for a short time practised by Bretonneau, are not easily accomplished: they also labour under the heavy drawback of having sometimes induced violent bronchial inflammation, and even peripneumonia. Their employment has now been generally abandoned.

Catheterism of the larynx, by enabling the application of medicinal agents to be made directly to the larynx, is an efficacious practice. I do not refer to catheterism as practised by M. Green of New York, with a long piece of whalebone, armed with a sponge at its extremity. The plan devised a few years ago by Loiseau of Montmartre for the treatment of croup is much more reliable. Although Professor Dieffenbach, in 1839, made use of the same method at the Charity Hospital of Berlin, Loiseau is not the less entitled to the honour of being its inventor, for when the idea suggested itself to him, he was entirely ignorant of what had been done by the German surgeon. Loiseau's method is this: he arms the first two phalanges of the index finger of the left hand with a bent metallic finger stall which leaves free the last joint and the distal phalanx. The finger thus protected is carried down into the throat as deep as possible, and with the extremity of the finger the epiglottis is raised. This being accomplished, nothing is easier than to introduce an instrument into the larynx. The instrument which Loiseau at first employed was a bent stem, armed with a receptacle for the solid nitrate of silver: he afterwards used a hollow sound resembling the laryngeal insufflator of Chaussier, an instrument which is bent, pierced with two eyes, cylindrical, broad at its upper extremity, and which gradually narrows towards a bent and abruptly flattened extremity. The affected parts can then be operated on by caustics, either by introducing through the catheter a whalebone rod to the end of which is attached a small sponge soaked in the caustic fluid which is pressed out through the eyes of the catheter, or by injecting a caustic solution through the instrument. This latter proceeding some of you may recollect seeing me employ in the case of a little girl of four years of age, whose case was published in the *Gazette des Hôpitaux* of 31st October, 1857.

When we consider how easily a fit of suffocation is caused by a foreign body touching the upper orifice of the larynx, we are apt to be frightened at the idea of introducing an instrument into the interior of that organ: there is much more reason to dread a suffocative attack, when liquids are injected into the air-passages. The only part of the operation which is painful to the patient is the seizure and elevation of the epiglottis. With reference to catheterism it may be stated, that the injection of even a considerable quantity of caustic fluid is well borne. These facts may undoubtedly be thus explained. Catheterism is not the introduction of a foreign body which by its presence tickles and excites the orifice of the larynx, but of a foreign body which rapidly traverses and in fact forces the passage. Now, if we suppose that the sentinels—if I may for a moment use that figurative expression—if we suppose that the sentinels, placed at the entrance of the air-tube, whose constant duty it is to prevent the admission of foreign bodies which might otherwise accidentally get in, are prevented from being of any service in consequence of the passage being forced, we see how it is that, unless the calibre of the tube be obstructed, suffocation will not be induced. In respect of the injection of liquids, it may be stated, that we know from experiments on animals that the trachea is very tolerant; and that caustic injections frequently provoke neither suffocative fits nor even coughing.

We may also, following the practice of Green, but carrying it out by a surer plan, by directing the instrument along the finger which holds open the laryngeal orifice, by following the method of Loiseau, we may introduce in a direct manner a stiffish whalebone rod armed with a small sponge soaked in a caustic solution. With this apparatus the larynx may be swabbed out in such a way as to free it from false membranes. When the false membranes resisted this treatment, Loiseau was in the habit of detaching them by the aid of flat curved forceps.

The method of Loiseau is certainly very ingenious, and in submitting it to the judgment of the Academy, he cited numerous cases in which he had obtained remarkable results.[1] Upon several occasions I have had an opportunity of witnessing its successful application; and among others in a child, a patient of my friend Dr. Gros, who

[1] Loiseau:—Bulletin de l'Académie Impériale de Médecine, 1857. T. xxii p. 1139.

communicated an account of the case to the Medical Society of the Hospitals on the 28th July, 1858.[1] I myself have only once had recourse to catheterism : the patient was a little girl of whom I am by-and-by going to speak to you. In her case you had an opportunity of judging of the harmless character of the operation, and the facility with which it is performed.

Loiseau's cases deserve attention, although perhaps the narrator has exaggerated the importance of the bearing of some of them. Cauterizations of the larynx may, in my opinion, under certain circumstances, be productive of great benefit.

Perchloride of iron has been recently brought forward as a specific remedy in diphtheria. Although I have not as yet had sufficient experience to entitle me to give an opinion as to the exact value of this medicine, I have employed it in a sufficient number of cases to justify me in refusing to admit that it possesses the specific properties which some practitioners have ascribed to it. It cannot be denied, however, that it has rendered real service both in my hands, and in those of the honourable physicians who first sounded its praises. You have seen me use it in the form of concentrated solution as a caustic agent, with a view to modify the character of the surfaces covered with diphtheritic exudation. You have also seen me administer it internally in a potion containing from 4 to 10 grammes [62—155 grains] which the patient takes during twenty-four hours. But its action is perhaps not more special than that of other ferruginous medicines, which, like it, are indicated in the general treatment of diphtheria. Its extreme solubility, however, gives it a certain advantage over other preparations of iron.

I have insisted, Gentlemen, upon the uselessness, the danger of antiphlogistics, which I absolutely interdict in the treatment of diphtheria. In passing before you in review the other different medicinal agents recommended in diphtheria, I have endeavoured to show that mercurials and alcalies, in so far as they are alterative remedies, present more disadvantages than advantages. I also told you, that certain medicines, such as sulphate of potash and polygala senega, to which for a time anti-diphtheritic properties were attributed, have justly fallen into oblivion. I have laid great stress upon the question of blisters, and have implored you never to employ them, their action in diphtheria being

[1] See the *Union Médicale* for 14th September, 1858.

deplorable and perilous in the highest degree. Finally, I stated that I had come to the conclusion, after the teaching of a long experience, that topical treatment by astringents, catheretics, and caustics is pre-eminently the best treatment of diphtheritic affections; but I did not say that it could by itself cure the disease.

General treatment constitutes an important part of the treatment of diphtheria. It ought to be essentially tonic and restorative, as in all diseases in which from the first the vital forces seem to be disturbed and depressed. Alimentation occupies the first place in the general treatment; and I have observed that the severer the attack, the more imperative is the necessity to sustain the patients with nourishing food. Loss of appetite, that is disgust for every kind of food, is one of the most alarming prognostic signs. We must try to overcome this loathing of food by every possible means: and to get nourishment taken, I sometimes do not hesitate, in the case of children, to threaten punishment. When the patient retains his appetite for food, there is good hope of recovery.

There are no rigid rules in respect of the choice of food. We are often obliged, in some individuals, to satisfy the strangest possible caprices of taste. In pseudo-membranous sore throat, when there are pain and difficulty in swallowing, I give nourishment in a semi-solid state—thick soups, farinaceous food, chocolate made with water, creams, boiled eggs, and such like alimentary articles. As soon as possible, I begin a more reparative animal diet.

The pharmaceutical agents which I employ in the general treatment are the preparations of cinchona and iron. I generally give the powder of yellow cinchona in doses of from one to two grammes [15½ to 31 grains] in a cup of *café noir*, the object of the coffee being to mask the bitterness of the drug, and facilitate its digestion. For those who have a repugnance to this preparation of bark, and also when I wish to obtain a more speedy effect, I substitute sulphate of quinine for the powder of cinchona, administering it also in a similar manner in coffee. I am likewise in the habit of prescribing the wine and syrup of cinchona. The preparations of iron which I prefer are those which are the most soluble, such as the perchloride, the citrate, and the tartrate.

Tracheotomy.

In the present day no one can deny its Utility and Necessity.—Mode of Operating.—The Dilator.—Operation ought to be very Slowly Performed: Dangers of Rapid Performance.—Dressing.—Cauterization of the Wound.—The Neckcloth.—General Treatment.—The Chances of Success are the Greater, the Less Energetic the Anterior Treatment has been.—Alimentation of the Patients.—Removal of the Canula.—Infected Canulæ.—A Condition favourable to Sueeess is to Operate as Soon as Possible.—Unfavourable Conditions.—Death is Certain in Malignant Diphtheria.—Death is Almost Certain in Children under Two Years.

Gentlemen:—Let us assume that all treatment has failed to prevent the propagation of diphtheria to the air-passages, and that croup exists—that we have in vain attempted to combat the disease by the measures which I have described to you, and which I must say are more frequently unsuccessful than successful; or let us suppose that we are called to a patient in whom there already exists confirmed croup, in whom asphyxia threatens, and in whom death is inevitable: under such circumstances, there still remains one important resource—*traeheotomy*. It was recommended by Stoll,[1] who, however, seems never to have performed it. John Andrée a London surgeon performed it for the first time; and with success, in 1782. The subject operated on was a child, an account of whose case Jacob Locatelli sent to Borsieri, by whom it was published in his Institutes.[2] At the beginning of the present century, Caron, a French physician, renewed the praises of tracheotomy, although he had only performed it once, and that unsuccessfully. It is in reality to Bretonneau that the merit of a first success is due; for John Andrée's case has been the subject of much controversy. After two unfortunate attempts in 1818 and 1820, the illustrious physician of Tours, undismayed by these disappointments, made a third attempt in 1825. The patient was the daughter of one of his most intimate friends, the Count de Puységur, who had had three children carried off by croup: this time, Bretonneau had the good

[1] Stoll:—Aphorismes sur l'Angine Inflammatoire.

[2] Borsieri:—Tome iv. Angina Trachealis, § ccccxxxvi.

fortune to save his patient. I believe I was the second person who, following the example of my master, performed tracheotomy in laryngeal diphtheria, and the second also to record a successful result of the operation. This case is now of old date. The child upon whom I operated was the son of a man whose name has in recent times made a certain noise—Marcillet, the magnetiser of Alexis, the somnambulist. I published the history of this case in 1833.[1] I have now performed the operation in more than two hundred cases of diphtheria; and I have the satisfaction of knowing that one fourth of these operations were successful. Others after me have pursued the same practice, and have met with success. It was at the Children's Hospital that I gave the first impulse to this practice. Now, there is not an *interne* who fulfils a year of duty at that establishment without having opportunities of snatching from the grave several children irrevocably lost but for his judicious operative intervention. The proportion of successful cases has greatly increased since, profiting by past experience, we have attached great importance to the management of the case after the operation. The details of the mode of management I shall have forthwith to enlarge upon. At the Children's Hospital, in the Rue de Sèvres, the proportion of successful cases in recent years has been more than a fifth, a large proportion, when we bear in mind the social position of the children who are brought to the hospital, and the deplorable treatment to which they have been subjected by midwives, quacks, and old women, whose advice is preferred by the lower classes to that of medical practitioners; and then again, still more, when we recollect the dangers of the hospital itself, where the unfortunate children operated on are in a hotbed of formidable and varied contagion, as is shown by the great frequency with which an attack of scarlatina, measles, small-pox or whooping-cough supervenes as a terrible complication, when all seems to be progressing favourably after trachcotomy. My impression is that one half of the cases operated on in private practice ought to prove successful, provided, of course, the operation is performed under conditions in which recovery is possible. I shall tell you what these conditions are. The successful results which are proclaimed on all sides speak so loudly in favour of operating, as to bear down all opposition; and I

[1] See *Journal des Connaissances Médico-Chirurgicales* for the month of September, 1833, Number First.

do not stand alone in preaching that there is an imperative duty imposed on the practitioner of performing tracheotomy, a duty as obligatory as tying the carotid artery when that vessel has been wounded, although death quite as often as recovery follows the operation. In the early days of tracheotomy in croup, there was a great deal of opposition to it; but at present, it has no opponents except among the wayward, ill-disposed, or ignorant. There is now no longer anything serious in the opposition: and henceforth the proceeding must be looked on as one conquest more of the healing art added to the ordinary practice of therapeutics.

Tracheotomy is opening the windpipe so as to allow air to enter when the natural orifice of the glottis is almost obliterated. The professor of operative medicine will pardon my encroaching for a moment upon his territory, that I may describe to you, if not in accordance with the rules of surgery, at least after my own fashion, an operation which physicians are more frequently called upon to perform than surgeons.

The *instruments* required are a sharp-pointed somewhat convex bistoury, and a probe-pointed bistoury; two blunt hooks with good handles, or failing them two hair-crimping pins; a *dilator* like a sort of dressing forceps curved at the extremity, with the two limbs forming at the end of the instrument a sort of spur projecting outwards, so as to enable it to fasten the lips of the tracheal wound and prevent their displacement by the respiratory movements. The use of this instrument is to dilate the opening made in the trachea, so as to allow the tube to be introduced. The tube ought to be double—an external and an internal canula. In the expanded extremity of the external tube are two apertures to receive tapes which are tied at the back of the neck, so as to keep the apparatus in its place. Besides these two apertures, there is in the upper part of the expanded extremity of the external canula a sort of key which fits into a slit in the corresponding part of the internal canula. The internal, which necessarily has a less diameter than the external canula, has two ears projecting from its expanded extremity, by which it can be held when it is wished to take it out or replace it: it is fixed to the external canula by the little key which I have mentioned and which can be easily opened and shut. The diameter of the tube ought to be considerable: it can never be too large, provided the instrument can easily enter the trachea. Its curve ought to form a quarter circle; this is the principle upon which all these

instruments are now made by M. Mathieu, who adopted the fixed standard to avoid inconveniences which I pointed out to him, the curve of the different tubes previously shown to me being either too great or too small, in consequence of the workmen having always departed from the exact form of the model placed in their hands. That the tube be double, is an absolute necessity; and when we see the manner in which Van Swieten insists on the necessity of using a double tube, and that he does so on the authority of the English author George Martin, it is remarkable that the precept was forgotten: it is strange too, that although the double canula was recommended by Bretonneau, who from his earliest operations employed an uncurved double tube, I myself for years employed the single tube.[1]

The dilator is indispensable. I have only once lost a child during the operation: the patient was under the care of my honourable colleague Dr. Barth. I went to the consultation ignorant of the state of matters; and found the child dying. Dr. Barth was prepared with tube and bistoury. From not having a dilator, I was unable to keep aside the vessels as I should have wished: I felt about with my finger for a long time before I was able to make an entrance into the trachea, and during that time, a great quantity of blood entered the bronchi and suffocated the patient: this could certainly not have happened, if I had had a dilator which I could at once, on making the incision, have introduced into the windpipe. When a dilator cannot be obtained, recourse may be had to a plan devised by Dr. Paul Guersant: it consists in arming the tube with an ordinary gum elastic catheter projecting some centimeters from the inferior opening of the tube. You can understand how much the manual proceedings will be simplified by this contrivance. The gum elastic catheter is easily introduced into the tracheal wound, the finger

[1] Van Swieten:—"Majus incommodum inveniabatur, dum mucosi humoris copia per tubi orificium effluens, ejusque lateribus adhærens, sensim inspissata angustabat tubi cavum, liberamque aeri ingressuro viam impedicbat; unde cogebatur Georgius Martinius tubum educere et mundare. Multum quidem hoc caveri potest, dum alterum tubi extremum multo latius liberum humoribus exitum permittit: interim tamen non incongruum videtur, *uti monuit celebris auctor*, si duplex foret tubulus in asperam arteriam dimissus, quorum major alterum exciperet." * * * "Hoc enim commodi a duplici tali tubo haberetur, quod interior eximi posset et mundari, dum exterior et major interim in vulnere maneret." [Commentaries à l'Aphorisme 813 de Boerhaave Paris: 1757, T. ii, p. 628.]

being used as a conductor; and then all that is required to get the canula into position is to cause it to slide upon the catheter.

I shall now describe the operation. The patient is laid on a table, on which there are a mattress and several folds of a blanket: a doubled up pillow, or better still a rouleau made with sheets, is placed under the shoulders and back of the neck, so as to put on the stretch the anterior region, and bring the trachea as much as possible into relief. This is undoubtedly a very distressing position for an individual in a state of asphyxia, but it has not to be long endured. An assistant placed behind the patient is appointed to hold the head firmly: another assistant placed opposite the operator is charged with keeping aside the different layers of tissue and the blood-vessels, by means of a blunt hook held in the left hand, while he is on the alert to use, when required, the right hand in sponging the wound with small sponges placed beside him ready for use. The assistance of other persons is also needed to prevent the patient moving. Finally, that I may omit nothing, let me add that if you operate at night, there must be some one to hold for you a candle giving a strong light. If the operation is performed in full day light, the patient ought to be placed directly in front of a window of the room, the feet being next the window, so that the light may fall full on the neck.

These precautions taken, the operator standing on the patient's right—observe I say the *right* and not the left because otherwise, unless he be ambidexter, he will be embarrassed by the projection of the chin: the operator, then, standing on the right of the patient, grasps the tracheal region with the left hand, when with the right hand, he makes an incision in the median line, from the cricoid cartilage to within a little of the sternum. The importance of making the incision in the median line is so great that if this rule be neglected, the operator is liable to be very much embarrassed during the whole of his proceedings. I recommend those who have no pretensions to surgery to draw on the skin the proper course of the bistoury with ink or a cork blackened in the flame of a candle. Having incised in succession the skin and the cervical aponeurosis, there is reached a small white mark indicating an interstice between the muscular masses. The blood now flowing is soaked up by the sponges: the operator then cuts in the line of the small white mark, separating the sterno-hyoid and sterno-thyroid muscles, which, by means of the blunt hook in his left hand, are held aside, while,

at the same time, the assistant who is in front of the operator separates them from each other. This is the point at which difficulties begin.

The isthmus of the thyroid gland has now been reached; its size and position vary so much, that it is sometimes found covering the first rings of the trachea, and at other times is much higher up. Lower down, we find the thyroid plexus of veins, and Neubauer's artery when it exists. Now is the time when the operator must bear in mind the cardinal precept, to avoid wounding the blood-vessels. If he see a large vein, he must dissect it out, and draw it to one side with the blunt hook. If the left subclavian vein, gorged with blood, shows itself in the jugular fossa, it may be depressed and protected by a finger, and the terrible accident be thereby avoided which would result from its being wounded. For still stronger reasons, attention ought to be paid to the trunk of the brachio-cephalix vein, which in children often projects considerably beyond the substernal fourchette.

As soon as the trachea is brought into view, it ought to be denuded, and a small incision made in it, as near as possible to the cricoid cartilage, the bistoury being directed upon the nail of the index finger which is placed at the bottom of the wound. A hissing noise indicates that the trachea has been opened: the sponge is now used, and then, by means of the probe-pointed bistoury the incision is forthwith enlarged. If the original opening has been made far from the cricoid cartilage, it must be enlarged by cutting from below upwards, so as to avoid the trunk of the brachio-cephalic vein. Many practitioners prefer opening the crico-thyroid space, cutting the cricoid cartilage or the two first tracheal rings, in accordance with Heister's plan. It is evident that by proceeding in this way, we penetrate the larynx itself; and that—as often happens—if the tube remain some weeks in the wound, the result will be partial necrosis of the cricoid cartilage and even of the thyroid cartilage, the probable source of serious ulterior consequences, among which may be mentioned an irremediable alteration of the voice. Let it be understood that I am now speaking of what ought to be done in cases of croup occurring both in adults and in children; for afterwards, when I shall have to speak to you of tracheotomy in other laryngeal affections, I shall have to point out that in the more aged a different method of proceeding is sometimes required. In cases of croup, it is only necessary to open the trachea.

I cannot, Gentlemen, too strongly insist upon the necessity of dividing the tissues layer by layer, holding aside the vessels and muscles by the blunt hooks, and entirely denuding, before opening, the trachea: I lay great stress upon the *absolute necessity* of proceeding *very slowly*. If, even during the operation, the child has a suffocative attack, stop to allow him to struggle, and permit him to sit up that he may get his breath: you may thus perhaps lose a minute, but of that you need not be afraid. I have never seen an accident arise from too much slowness; but I have often witnessed the difficulties and dangers of a too nimble tracheotomy, even when performed by an able operator.

Hence it is, therefore, that I denounce with all my strength the *expeditious* mode of operating lately recommended by Chassaignac, which consists in fixing the larynx by means of a tenaculum, and then penetrating the trachea by a direct puncture through the skin and subjacent parts. This is not a new method of performing tracheotomy. In 1586, Sanctorius, who seems to have been the first to practise bronchotomy, proposed puncture of the trachea with the trocar which he had invented for performing abdominal paracentesis. In 1748, Garengeot recommended larynocentesis as being very superior to the operation by which we reach the trachea step by step: he, however, advised that the skin, without disturbing the muscles, should be incised in the first instance, at least in thin subjects.[1] Direct puncture without previous incision is also recommended by Heister[2] because it is more expeditious, and because it saves suffering to the patient, as one stroke makes the puncture with the trochar and introduces the canula into the windpipe. Decker, Bauchot, Barbeau-Dubourd, and Richter had thought of bronchotomy, with a view of rendering the operation safer and quicker. Van Swieten, in the 813th Commentary, which I have just referred to, speaks at some length of bronchotomy, which he denounces as dangerous, after having performed it experimentally on the dead body, and on living animals.[3] A. Bérard, who also had invented a pro-

[1] Garengeot:—Opérations de Chirurgie. T. ii, p. 447 & 448.

[2] Heister:—Institutions de Chirurgie. T. iii, p. 153, année 1770.

[3] Van Swieten:—"Tentavi aliquoties in cadavere et in vivis animalibus hanc methodum, sed videbatur mihi admodùm difficilis, et non carere periculo, ne quandoque valida vi adactum instrumentum deviaret, unde crederem priorem methodum, licet magis operosam, præferendam esse." [*Commentaria in Boerhaavii Aphorism. de coognosc. et curand. morbis: Aph.* 813, *T.* ii, *p.* 627.]

ceeding similar to that of Heister, ultimately discovered that the quickest was not always the best method: towards the close of his career, he renounced his expeditious proceeding for the more common and safer operation. Dr. Paul Guersant likewise adopted, for a short time, the expeditious method; and although he operates better and more quickly than those of us who are not surgeons, he proceeds sufficiently slowly to avoid the serious mishaps to which I have directed your attention. On the one hand, there is the danger of fixing the larynx, for as Dr. A. Millard has sensibly remarked in his excellent thesis,[1] and as Lenoir[2] had previously said in 1841, by impeding movements connected with the exercise of a function already threatened, you run the risk of accelerating asphyxia and death; and on the other hand, there is the risk of exciting fatal hæmorrhage, if by accident the instrument wounds a vessel from encountering an anomalous distribution of arteries, as happened in a case communicated to me by Dr. Richet. In a little girl, in whom he had operated for croup, he was obliged, just at the moment he was going to open the trachea, to divide an artery almost as large as the radial: it was an anastomosis of the two inferior thyroids. The bleeding was stopped by the application of a ligature to each of the extremities of the divided vessel; and the able operator had to congratulate himself upon the slowness with which he was in the habit of performing tracheotomy. In another case, I found the left carotid artery arising from the trunk of the innominata, and crossing the trachea. Again, it is not easier to puncture the trachea through the skin, than from the bottom of a wound: still, the instrument may deviate, and in place of entering the windpipe, may penetrate the œsophagus, an accident which occurred to my colleague Dr. A. Bérard. Finally; what ought to be done, if at the moment of introducing the tube, an obstacle is presented by the false membrane lining the trachea? How are you to see what to do at the bottom of a deep narrow wound inundated with blood? Under such circumstances, death will be inevitable.

Some of you, who have followed my clinic for several years past, will recollect that the very case I have now supposed actually occurred in our wards. On the 27th May, a little girl of four years of age was brought to me suffering from croup: as she was at the

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[1] A. Millard:—De la Trachéotomie dans le cas de Croup. Paris, 1858.

[2] Lenoir:—De la Bronchotomie. Thèse, 1841.

last extremity, I lost no time in resorting to tracheotomy. Just as I had laid bare the trachea, I cut a somewhat large thyroid vein: with the view of arresting the hæmorrhage, which was rather abundant, I hastened to introduce the canula. This, however, did not re-establish respiration: there was a great degree of suffocation, and the face of the little patient was frightfully livid. I withdrew the canula, and introduced the dilator. The child was in a state of apparent death, respiration was suspended; and the pupils were dilated, indicating that asphyxia had proceeded very far. We then caused the thorax to perform blowing movements: after a minute and a half or two minutes, an interval which seemed dreadfully long, we saw the patient make some grimaces; then, a deep inspiration drew air into the chest, and brought back life. An occurrence had taken place similar to others I had observed during my long practice. False membrane coated the larynx, trachea, and bronchi; and whilst I was inserting the canula, this false membrane, being torn, was compacted by my instrument in such a way as to completely obstruct the passage of air. After I had withdrawn the canula and introduced the dilator, respiration was re-established: the false membrane was then seen at the opening of the trachea: I removed by the forceps a large piece of it, which was branched at its inferior extremity. When the canula was readjusted in its place, other portions of false membrane, coming from the bronchial tubes, passed out through it, their expulsion being promoted by coughing excited by tickling the trachea with a feather. These portions of false membrane were tubular, and their calibre showed that the diphtheritic affection had reached far down into the lungs, so that although respiration was re-established, there was no permanent advantage to be hoped for from the operation. The child died during the night.

The expeditious method exposes the patient to another accident, which, it is true, may also sometimes arise when the safer operative proceeding is followed. I refer to *emphysema* of the cellular tissue, resulting either from want of parallelism in the incisions through the soft parts and the trachea, or from the opening into the tracheal wound being so narrow as to make the introduction of the canula a difficulty. There is nothing in this emphysema to occasion anxiety. When limited to the neck and the neighbourhood of the wound, it quickly disappears, and may be looked on as an accident of no consequence. But when it is so extensive as to invade the chest, it tends to embarrass the breathing: if it reach the face, it has the additional

drawbacks of disfiguring the patient and frightening the family. It sometimes attains extraordinary proportions, becoming almost general, as occurred in a case observed by Dr. Millard: it is then a very serious complication. In addition to the dyspnœa which it occasions, it gives rise to so much swelling of all the tissues of the neck and consequently makes the wound so deep, that the common tracheal tubes are too short to reach the trachea, and it becomes necessary to have recourse to very troublesome expedients.

Operate slowly, therefore,—very slowly. When the trachea is opened, the operation is not completed: what remains to be done, though not the most difficult part of the proceeding, is that which demands the greatest amount of coolness and presence of mind. This is the moment when the blood deluges the bronchi, when the venous hæmorrhage, so far from stopping, becomes more abundant, in consequence of the respiration being more difficult. It is now necessary at once to take the dilator, which ought to be lying ready to hand, and introduce it shut between the lips of the wound in the trachea, and then open it moderately by separating its rings. This manipulation, however easy it may seem from description, does not the less require some practice. I have very often placed the extremity of the instrument between the muscles, and have only introduced one of its branches into the trachea. Here again, it is essential to proceed slowly: it is necessary to go as deep as possible. When the dilator is properly placed, the air enters easily: the blood, mucus, and false membrane are discharged; and respiration, in general, becomes easy. At this stage of the operation, the assistant who holds the patient's head ought to elevate it a little in front, so as to facilitate the introduction of the dilator, by relaxing the edges of the wound, and so favouring the discharge of the blood and mucus. If there is taking place a somewhat abundant venous hæmorrhage, as in the case I have just related to you, at once introduce the canula, and when you have done so, the bleeding will immediately cease.

The dilator serves as a director in introducing the canula, which ought to be previously provided with a caoutchouc shield, or covered with oiled silk, so as to prevent its expanded part from causing excoriation of the skin of the neck. This stage of the operation is often very difficult: sometimes the operator misses the opening in the trachea, and buries the instrument in front of it, in the cellular tissue. The entrance of the tube into the windpipe is known to have taken place by the escape of air and mucus from its external orifice,

and by the facility with which respiration is performed. It is indispensable that the canula be of sufficient length to extend into the trachea one or two centimeters beyond the inferior angle of the opening which has been made into that passage. If too short, it is displaced by coughing, and gets out of the trachea into a sort of pouch which always exists in front of it: in a few minutes, the patient dies asphyxiated. Thrice have I had to deplore this frightful accident, though I had left my patients after the operation, under the charge of pupils who were not without experience. To avoid similar catastrophes, it is essential to secure the canula firmly in its place by tapes carried round the neck.

Provided the canula be introduced into the trachea, it really matters little how that has been accomplished. Whether the operation has been performed with more or less dexterity, or with more or less rapidity, the result is the same, provided there has not been hæmorrhage. Loss of blood has a very unfavourable influence upon the results of the operation.

Treatment in relation to tracheotomy is a subject which has still to be considered. This, which is entirely a medical question, is now looked upon as of paramount importance: nor is this surprising when we consider that some lose nearly all their patients, while others save a third or even a half. I should be doing wrong, were I only to speak of that which has to be done: great importance must be conceded to the treatment of the cases prior to the operation. The majority of physicians are fortunately agreed that remedies intended to act on the entire economy are often useless, and that the chances of success are all the greater, the less energetic the therapeutic measures which are employed; that, in particular, blisters are very objectionable, as I have often pointed out: consequently, they do not exhaust their little patients by the abstraction of blood, and they abstain from using blisters. I am convinced that the greater success which has attended tracheotomy in recent years is due to the sounder principles of treatment which during that period has been pursued by my professional brethren.

Before entering upon the subject of consecutive treatment, I ought to mention some details regarding the manner of dressing the wound, to which it may appear perhaps that I attach undue importance; but the older I grow, the more do I become convinced that attention to minutiæ is of much more importance in therapeutics than is generally believed. I have already mentioned the importance of interposing

a piece of caoutchouc or oiled silk between the expanded part of the tube and the wound in the trachea, so as to prevent the occurrence of irritation; and I have referred to the necessity of keeping the tube in its place by tapes or bands. Other minutiæ are deserving of notice.

The neck ought to be surrounded by a knitted comforter or with a large muslin neckcloth, so that the patient may expire into this thick material, and inspire air impregnated with the steam supplied by his expiration. This is a rule of fundamental importance; by attending to it the interior of the canula as well as of the trachea is prevented from becoming dry: irritation of the mucous membrane is guarded against, and there is also provision made against the formation of coriaceous crusts similar to those which form in the nose in coryza—crusts which become detached as tubes or fragments of tubes, leading to terrible fits of suffocation, and sometimes causing death from occlusion of the canal. Before Dr. Paul Guersant and I had adopted this plan, we lost a great many of the patients we operated on from catarrhal pneumonia: this is now a much less usual cause of death. Probably, the introduction of warm moist air into the bronchi is a condition exceedingly favourable to the prevention of pneumonic attacks.

The plan of covering the neck with a cravat was adopted in old times. The object, however, for which it was recommended was to prevent the entrance by the canula of dust and small bodies which might be floating about in the air. As G. Martin remarked, this fear was chimerical. But in addition to the precaution of wearing a cravat, from their point of view, an unnecessary precaution, the old physicians advised the patients to be kept in warm rooms: for, said they, the cold air may prove injurious, inasmuch as the air which reaches the lungs by ordinary respiration is warmed in passing through the mouth and nasal cavities. This was the opinion enunciated by Van Swieten.[1] Garengeot, however, grasped the true

[1] Van Swieten:—"Solliciti pariter fuerunt plerique hujus operationis descriptores, ut caverent ne una cum aere pulvisculi in illo volitantes patulum tubi orificium intrarent libere; hinc gossypio, linteo carpto, spongia, etc., tegi voluerunt extrorsum patens tubuli orificium. Martinius tamen usu didicit nullam notabilem inde noxam ægro accidere, licet non tegeretur tubuli orificium, quamvis etiam in domo non adeò nitida decumberet æger. Si tamen inde quid metueretur, posset hoc facile evitari, si collo circumduceretur laxe rarum linteum, spleniis ita in vicina tubuli dispositis, ut illud quidem tegeret tubi orificium, non tangeret. Expediet tamen ut aer parum calidior sit in loco

indication when he recommended the placing of cotton over the orifice of the canula, *to modify the air entering the trachea*, or better still, placing over the orifice of the canula a pledget of fine lint or a piece of linen of rather loose texture. In our day it has been proposed to evolve steam in the patient's room, but this is certainly neither a simpler nor more convenient method than the cravat.

There is still another practice, without having recourse to which recovery seldom occurs. I refer to *cauterization of the wound*. Immediately after the operation, and during the four following days, all the cut surfaces ought to be vigorously rubbed with solid nitrate of silver. By this means an action very much to be dreaded is prevented—viz. the wound being affected with diphtheria, and becoming covered with thick and fœtid false membrane. Moreover, the specific diphtheritic inflammation, spreading to the surrounding cellular tissue, often originates in that situation phlegmonous erysipelas of a bad character, leading to local gangrene, or at least to violent symptomatic fever, and general poisoning of the system, a condition from which recoveries are rare. Dr. Millard states in his thesis that he never performs this cauterization at the time of the operation; and according to information which I have obtained from one of the ministering sisters of the Hospital of the Rue de Sèvres, possessed of great practice and experience in the treatment there followed by my colleagues, it is never performed till, at the soonest, twenty-four hours after the operation; if the child have fever, it is allowed to subside before cauterization is performed, and it is also considered necessary that the child be not intractable. I am opposed to these rules of practice, because I have witnessed the bad consequences which result from observing them. After the fifth day, the surface of the wound is so modified that the complications which have been referred to are no longer to be dreaded.

When once the operation has been performed, the first care of the physician ought to be the nourishment of the patient. Alimentation, Gentlemen, as I have reiterated on several occasions, is the chief remedy in the majority of acute diseases, and particularly in those of childhood. There can be no doubt that abstinence, as prescribed by Broussais, and as still inculcated by a great many physicians, who,

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quo decumbit æger, eum frigore suo nocere plus posset quam dum communi respirationis via in pulmonem trahibur, semper in transitu vel os vel nares calescens utcumque." [*Loc. cit.* p. 628.]

unable to put off the old man, retain too strongly the prejudices of their early medical education, is one of the deadliest complications of disease, that which is most calculated to keep up the contamination of the system, the most calculated to promote the absorption from without of miasmata and of morbid elements formed from the diseased body—the most opposed to that power of resistance which is the great well-spring of convalescence and of ultimate recovery. I do not mean to say that it is necessary to cram the little patients with food: I only wish to say that their appetite for food, if it exist, ought to be gratified, and that if they have a repugnance to it, it is then essential to force them to take a little. I revert to this point, upon which I have already spoken when discussing the general treatment of diphtheria: do not be afraid of employing intimidation. Many is the time, that, arming myself with an assumed expression of great severity, I have obliged children to take food, and have thus paved the way for recovery, which otherwise could not have taken place. The alimentary articles which I most insist on are milk, eggs, cream, chocolate, and soup. If necessary, the œsophageal tube must be used to introduce into the stomach the sustaining food which the child refuses to swallow.

What I have now said sufficiently indicates that I absolutely interdict the continuance after the operation, of certain means, which before it, might be judged more or less useful, such as calomel, alum, emetics, and purgatives. Such remedies are quite incompatible with the nature of the alimentation which I recommend.

It is a remarkable fact, that when once tracheotomy has been performed, there need no longer be entertained any anxiety regarding the diphtheritic manifestations of the pharynx or larynx which formerly it was imperative to attack by very active measures: they disappear spontaneously. It appears that by the time the disease has reached the air-passages, it has exhausted itself; and that if by admitting air to the lungs, by tracheotomy, the patient be prevented from dying, recovery will take place. I speak of the pharyngeal and laryngeal, and not of the *cutaneous* manifestations; for the latter ought always to be most determinedly followed up and eradicated by the topical means which I have indicated, lest otherwise, they become, through absorption, the source of a deadly general poisoning of the system.

When first I practised tracheotomy, following Bretonneau's

example, I was in the habit of prescribing the mopping out of the windpipe, as far down as it was possible to reach, with a small sponge fixed to the end of a piece of whalebone. I have long since discontinued this proceeding: I have likewise relinquished cauterization of the trachea which I used to perform, by applying to it a sponge soaked in a caustic solution, or by dropping into it some of that solution. These proceedings have seemed to be productive of inconveniences which were not counterbalanced by any real advantages. I may here add that the dropping in of the solution of chlorate of soda, as recommended by Dr. Barthez, was abandoned by that physcian himself, after he had made it the subject of a communication to the Medical Society of the Hospitals.

The frequent cleansing of the internal canula is an essentially necessary precaution, so that the ingress of air may be as free as possible. I recommend that this cleansing should be performed every two hours.

There still remains a word to be said on the last part of the treatment, which is one of some delicacy. I refer to the removal of the tube, and the final closure of the wound.

I do not speak of Dr. Millard's method of temporarily removing the canula from the very first dressing, twenty-four hours after the operation. The idea of my intelligent young colleague is that by so acting, he assists the expulsion of bulky false membranes, which by being allowed to remain in the canula, may, by choking it up, induce fits of suffocation. Unquestionably, in cases in which there is risk of suffocation, the removal of the tube is proper; but, under ordinary circumstances, I see no advantage in, far less any necessity for, this proceeding. In saying this, I am not the less decidedly of opinion that the sooner the better the canula can be finally removed; but this can seldom be done before the sixth day: the cases are few in which the tube ought to remain after the tenth. There are cases, however, in which recovery takes place after the larynx has remained completely closed for fifteen, twenty, or even for twenty-four days, as I saw in the case of a young girl. I have mentioned the case of a child who retained the canula for five years. That patient is still alive, but has a tracheal fistula.

The tube ought to be removed at the end of the first week, care being taken not to make the child cry or be frightened. The poor little creatures who have been operated on are so much accustomed to breathe by the artificial passage, that when it is closed, to facilitate

the entrance of air through the larynx, they are apt to be seized with a paroxysm of fear, which finds expression in excitement and cries, leading to acceleration of the respiratory movements. The larynx is, at this period, somewhat obstructed by slightly adherent false membrane, by the presence of mucus, or by the existence of slight swelling of the mucous membrane; and possibly, also, the laryngeal muscles may have lost the habit of giving harmonious response to the demands of the respiratory function: from these causes, there is often greatly embarrassed breathing. In the majority of cases, this embarrassment passes away pretty readily, provided the little patient can be tranquillised: the accomplishment of this is more within the province of the mother than of the physician. The wound has now to be closed with strips of adhesive plaster. If the sound of the cough or the respiration, if the nature of the voice or the cry show that the laryngeal passage has become fairly patent, the dressing is completed in such a way as to promote immediate union of the edges of the wound; but if the air does not enter in sufficient quantity, the adhesive plaster is not put on: the wound is, under such circumstances, simply dressed with a piece of loose linen smeared with cerate, and the closing of the wound is delayed till next day. Should there be no passage of air through the larynx, the canula must be replaced, another trial being made two or three days later. As soon as respiration is well performed with the artificial opening closed, the wound ought to be dressed two or three times a day: generally, the opening into the trachea ceases to exist at the end of four or five days: all that remains to be attended to is dressing the external wound, till its closure, which soon takes place.

The presence of the canula may occasion—and that sometimes with considerable rapidity—a serious occurrence, to which Dr. Henri Roger in particular has called attention: I refer to *ulceration of the trachea*.[1] From the researches of this intelligent observer, it appears that ulceration of the windpipe is a frequent consequence of the contact of the canula, and that the lesion varies from a mere superficial erosion to a complete perforation. Dr. Roger has observed that ulceration of the anterior is much more frequent than of the posterior wall of the trachea: it arises in the former case from the

[1] Roger (Henri):—Des Ulcérations de la Trachée-artère Produites par le séjour de la Canule après la Trachéotomie. [*Archives Générales de Médecine*; 1859.]

friction of the lower edge, and in the latter, from contact with the curve of the canula. Complete perforation of the trachea by ulceration is obviously a very formidable accident: in two cases communicated by Dr. Barthez, nothing intervened between the canula and the brachio-cephalic artery except the muscular coat of the trachea: at other times, the tracheal lesion has caused the formation of abscesses and purulent sinuses: in any case, this ulceration becomes a new cause of loss of power from the suppuration which it induces.

As these ulcerations are evidently caused by excessive friction; and as friction cannot be altogether avoided, the problem is, how to render it as moderate as possible. Dr. Roger first of all proposed to adopt the curve of which I speak, and then proposed to make the body of the canula move on its expanded extremity, so that in all the movements of the trachea, the body of the canula should move with the trachea, without rubbing against the side of the passage with which it is in contact, the friction being upon the expanded extremity of the canula, with which it is loosely articulated. In this way, the expanded extremity of the canula is solidly fixed to the neck; and the body of the instrument, which is in contact with the wound and with the internal surface of the trachea, moves upon the expanded extremity. Since the publication of Dr. Roger's work, only jointed tubes have been used at the Children's Hospital, and since that time also, ulcerations have been less frequent, as well as less serious when they have occurred. Although I believe that the predominating bad character, and the special constitution of an epidemic, have much to do with the frequency of the lesions pointed out by Dr. Roger, I do not hesitate to recognise in his suggestions a real step in advance: and consequently, I recommend you to prefer articulated to non-articulated tubes.

Difficulty in swallowing is a formidable symptom to which I long ago directed attention, and to which Dr. Archambault attaches special importance. This difficulty arises from fluids passing through the glottis: the result is violent convulsive cough every time the child tries to drink; and the fluids, entering the trachea and bronchi, spurt out in quantity by the canula. Besides the serious consequences arising from the contact of fluid aliment (which is sometimes insoluble and consequently irritating) with the bronchial mucous membrane, children sometimes feel an insurmountable disgust at food, and prefer to allow themselves to die from hunger than

to eat or drink. This complication has too often been the cause of death after tracheotomy not to stimulate me to use all my efforts to find a means of contending against it. The best plan is to interdict liquid food: I give children very thick food, milk or beef-tea thickened with vermicelli to such a consistence as to render it fitter to be eaten with the fork than with the spoon; or I give them hard eggs, well boiled eggs beat up with milk, and underdone butcher-meat: I interdict every kind of fluid. Should excessive thirst, however, exist, I allow pure cold water, taking care that it is given a long time after, or immediately before eating, so as to avoid the excitation of vomiting. It ought, however, to be remarked, that the symptom of which I am speaking rarely begins to show itself till three or four days after the operation, and that it seldom continues later than the tenth day, although in some children I have seen it last much longer.

One might suppose that the laryngeal passage, which is thus so very open for the reception of drinks and liquid food, must also be sufficiently open to admit air enough for the purposes of respiration; but such is not the case. It is found, on removing the canula, that the laryngeal aperture is still inadequate; and even some days later, upon closing the wound with strips of adhesive plaster, the symptoms just described continue with equal violence.

It is not very easy to explain these symptoms—this difficulty of swallowing. Dr. Archambault believes that the child who has breathed through a canula for some days loses the habit of harmoniously moving the muscles which shut the larynx, and of managing those which propel the alimentary bolus into the œsophagus. He says that he has discovered a remedy for this dysphagia: it is sufficiently ingenious, and consists in closing the canula for an instant, with the finger, at the moment when something has to be swallowed: in this way, the child is obliged to open his larynx, and thus, normal harmony of muscular action is re-established. In some cases, this little stratagem is successful, but generally it is a complete failure. This frequency of failure is explained by what I have already said; for even when the canula is removed and the wound is quite closed, difficulty of deglutition continues, although the laryngeal respiration is free and regular: this probably depends upon the muscles of these parts being affected with that paralysis of which I have spoken to you at some length.

I have now, Gentlemen, laid before you my views on the opera-

tion of tracheotomy, and have stated the little precautions which ought to be attended to, so that success may be secured. I have once more repeated precepts which I have a hundred times proclaimed during past years. I should, however, leave the subject unfinished, were I to omit speaking to you of the conditions under which the operation ought to be performed.

First of all, *what is the period of croup most opportune for interfering by operation?* In 1834, I wrote, and in 1851, I repeated the statement:—"So long as tracheotomy did not prove a reliable resource in my hands, I said that the operation ought to be delayed as long as possible; but now, when my successful cases are numerous, I say that it ought to be performed as soon as possible."[1] Modifying that proposition, so as to deprive it of its absolute form, I still maintain that *the earlier the operation is performed, the greater are the chances of success.* The ingenious experiments of Dr. Faure have indeed demonstrated that when an animal is slowly and methodically asphyxiated, clots form in the heart and large vessels during the latter period of life.[2] The operation ought, therefore, to be performed before death is imminent; but still, let me add, that to whatever degree asphyxia may have proceeded—though the child should only have minutes to live—tracheotomy ought to be tried: *there is a chance of success, provided the local lesion, the croup, constitutes the chief danger of the disease.*

This limitation is important: for if the diphtheritic poisoning has seriously tainted the economy; if the skin and nasal fossæ are the seat of the specific inflammation; if a rapid pulse, delirium, and prostration indicate extreme poisoning; if in a word, we have to do with malignant diphtheria, the chief danger is in the general state of the patient, and not in the local lesion of the larynx or trachea. The operation must not be attempted in such cases, as in them it is invariably followed by death.

The condition which exceeds all the rest in value as a prognostic of success, as has been admirably expressed by Dr. Millard in his excellent thesis,[3] is the predominance of the symptoms of asphyxia

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[1] *Journal des Connaissances Médico-Chirurgicales* for *September*, 1834: and Nouvelles Recherches sur la Période Extrême du Croup, in the *Union Médicale* for 1851.

[2] Faure:—*Archives Générales de Médecine:* 5me série.

[3] Millard:—(Herman) *De la Trachéotomie dans le cas du Croup:* Observations recueilles à l'Hôpital des Enfants Malades. [*Thèse*] Paris, 1858.

over all the patient's other symptoms. "Unfortunately," says he, "it is not always easy to be quite sure amid an aggregate of symptoms, often very complex, what symptoms are dependent upon the physical affection, and what are due to diphtheritic poisoning of the system or to some special complication." We are often obliged to follow the indication which is most urgent, constrained to make the dying child breathe, and do not perceive till after doing so, that there is no chance of recovery: even when we suspect the presence of incipient death, we feel compelled to operate, notwithstanding the almost hopelessness of the case, simply because there is no absolute certainty as to its hopeless nature. "Operations for tracheotomy," continues the same author, whom I take a pleasure in quoting, "performed under such circumstances are not otherwise objectionable, except in this, that they figure in statistics along with other cases, and so have a tendency to mislead opinion and to discredit one of the greatest triumphs of curative art. The fear of reducing the proportion of successful cases must not, however, too easily induce the physician to desist from operating: he must not assume so grave a responsibility, till he has made a minute methodical analysis of all the symptoms, and has detected the existence of an inevitable cause of death. I have on several occasions exercised this right, in cases which would not have borne discussion, and at the autopsy, I have never regretted having followed this course: but in every case in which I have had the slightest doubt, however unfavourable the conditions for operating may have been, I have used the bistoury, deeply impressed with the soundness of the maxim—*Melius anceps quam nullum.*" These, Gentlemen, are the words of wisdom, and I most heartily adopt them.

Age is still a question which remains to be considered. It is one of chief importance, and requires to be well weighed. I have stated, that in the croup of adults, tracheotomy is less successful than in children. I gave you as a reason—possibly an incorrect reason—that in adults, from the anatomical disposition of the parts, the passage of the air into the lungs has been left free for a longer period, so that the diphtheria has had time to gain the bronchial tubes and their minute ramifications, before the absolute necessity has arisen for having recourse to tracheotomy: but in children, success is all the more certain, that the child is not very young. This is a fact which has been clearly established by the statistical

tables given to elucidate the question of age in the works of Dr. Millard and Dr. Peter.

Dr. Peter says:—"Both in boys and in girls, trachcotomy was always unsuccessful when performed on very young subjects: thus in 56 girls and 51 boys, on whom tracheotomy was performed during the year 1858 at the Children's Hospital, it was performed 15 times on girls between two and three years of age, and 11 times upon boys between the same ages: in these 26 cases it failed. It was only in children above three years that successful cases occurred. Taking as the basis of comparison a very large number of cases of trachcotomy, it was found that the age which gave the largest proportion of recoveries was five years in boys; viz. 7 recoveries in 8 operations; and six years in girls, viz. 3 recoveries in 4 operations."[1] Again, to quote Dr. Peter, who, in the work from which I have just quoted thus expresses an opinion in conformity with my own:—"Children below two and up to two and a half years of age seem to sink under the influence of traumatic fever, and it is generally during the twenty-four or thirty-six hours which immediately follow the operation that death occurs. Scarcely have two hours elapsed after the operation, when the number of pulsations and respirations increase in a remarkable manner, and the temperature of the skin rises in the same degree: then, little by little, the face becomes red, and there is burning thirst, while the heat of the body is dry and intolerable: the child sinks into a slumber, which is occasionally disturbed by some convulsive movements: and then he dies."

You are aware that before two years of age croup seldom occurs; but still, as you may meet with cases in children of an earlier age, even in children at the breast (as has occurred in my own practice), it is essential to bear in mind that at that period of life, there is a very small chance of tracheotomy proving successful. I must tell you, however, that in 1834, I operated on and cured a child thirteen months old; and with your permission I shall now relate the history of this case which I published in the *Journal des Connaissances Médico-Chirurgicales* for June 1834.

On the morning of Sunday, 11th May, 1834, Dr. Corsin sent for me to see the child of a carter of Petite-Vilette, by name Pierre

[1] Peter (Michel): Relation d'une Epidémie de Diphthérie, observée à l'Hôpital des Enfants en 1858. [Mémoire Couronnée par la Faculté en 1859.]

Drodlinger. The child was an unweaned boy, thirteen months old. He had had cough for four days: and during the night of Saturday, great oppression of the breathing supervened: the cough in the first instance, completely ceased, and the voice was lost. Under these circumstances, Dr. Corsin was called in, and finding that the patient was already in a desperate state, he restricted his treatment to the administration of a draught of tartar emetic and musk: and immediately sent for me. The symptoms of croup were well marked: the suffocative fits were so severe, and followed each other in such close succession, that I made the necessary arrangements for performing tracheotomy.

The operation was difficult: at last, after being occupied with it for ten minutes, I opened the trachea; and just as I did so, a large strip of false membrane was spurted out to some distance. I cleared out the trachea and bronchial tubes, injected eight or ten drops of a solution of nitrate of silver, and inserted a canula. The poor child breathed at his ease: with fear he regarded us, and looked about for his mother, who had fled from the house. I sent for her: when she arrived, the little fellow stretched out his arms to her, immediately unfastening her dress and the neckerchief which covered her bosom, set himself to suck with avidity. For three days, the canula was changed evening and morning, and every six hours, I introduced some of the solution of nitrate of silver: on the fourth day, this injection was performed for the last time. Every hour, some drops of water were thrown into the trachea, and the canula was mopped out. The introduction of water was continued for ten days. During the first four days after the operation, the child threw off pellicular masses; and one of the pellicles expectorated on the second day was of considerable thickness.

Fever set in some hours after the operation, and subsided on the third day. On the seventh day, the introduction of a new canula irritated the wound, caused swelling of the edges of the opening, an rekindled high fever. By the ninth day, these symptoms were calmed down: on the tenth day, a great part of the air which entered the lungs, passed through the larynx: on the eleventh day, the canula was removed, and the wound closed. Next day, all the air passed through the larynx.

I have had very recently another successful case which I may place in the same category with that now detailed, although the child, being two years old all but six days, was on the very confines

of that age within which I said the operation was attended with very little hope of success. This patient was a female child born on the 30th April, 1856: she was brought to our wards on the 24th April, 1858, having then all the symptoms of the last stage of croup. There was no trace remaining of pharyngeal diphtheria: I operated on her, and after the operation, she evacuated strips of false membrane through the artificial opening in the neck. Convalescence was long and difficult. It was impossible to remove the canula finally till the seventeenth day, although before that date several attempts to do so were made. Diphtheria invaded the wound, and was only got rid of by repeated cauterizations. An attack of distinct small-pox afterwards supervened, but did not impede the progress of the cure; which was complete on the 13th May, when the child was taken from the Hôtel-Dieu.

This case, that of the child Drodlinger, and the memoir of Dr. Maslieurat-Lagémard presented to the Academy of Medicine in 1841, inspired confidence in the value of the operation of tracheotomy in croup irrespective of the age of the patient. Dr. Maslieurat's memoir contained the report of a third successful case of tracheotomy in a very young child—in a child of twenty-three months old. To these cases I can now add a fourth, for which we are indebted to Dr. Bell of Edinburgh, who, in 1862, performed tracheotomy with success in a child of seven months: also a fifth case, published by Dr. Barthez,[1] my honourable colleague in the hospitals, the subject of which was a little girl of thirteen months.

Great clinical importance belongs to these cases: they stand alone in the records of science, but still they seem to me to justify operative intervention, irrespective of the age of the patient, whenever asphyxia threatens life. Possibly, at some future period, we may be able to calculate from statistical data the probability of success from tracheotomy performed on very young children: but even though the chance of success should be found to be small, I should not hesitate to recommend the operation, because, when it is well executed, it is not in itself a source of danger, and may often offer the only hope of saving the patient's life.

In conclusion, Gentlemen, I sum up the whole argument by saying, that whatever be the age of your patients you ought always to give them the chance of being saved by trachcotomy, when there is

[1] Barthez:—*Gazette Hebdomadaire*, for 19th December, 1862.

no special or absolute contra-indication. Should the performance of the operation be difficult, in consequence of narrowness of the trachea, from shortness or fatness of the neck, be assured that by operating slowly, and in accordance with my precepts, you will be enabled to surmount all the little obstacles originating in these conditions.

LECTURE XXI.

THRUSH.

Synonyms.—Micrographists regard it as a Myeelium.—Arises from Modification of the Secretions produced by Inflammation of the Mouth.—In Adults, is met with in advanced stage of nearly all Chronic Diseases.—Accompanies Intestinal Derangement.—In Children, supervenes also in Diseases, which, regard being had to the Age of the Subject, may be considered Chronic.—Indieates, irrespective of the cause, a general state of Inanition.—When purely Local, is Not a Serious Affection.—Mixed Thrush.—The Mouldy Eruption of Thrush may beeome developed on any Mucous Membrane covered with Epithelium in which Seerction is Altered.—The Different Erythematous Affections which Accompany it depend upon a General State of the System.—Treatment: The Local Lesion is Easily Destroyed.—Necessary to Continue the Use of Topical Agents for some days after the Disappearance of Thrush to Modify the Inflamed State of the Mucous Membrane.—Same Treatment is Applicable to the Cutaneous Lesions.—When Thrush depends on a General Condition of the System, the Treatment must be directed to the removal of the Causes of that Condition.

Gentlemen,—A woman, who had been confined a fortnight previously in the Lariboisière Hospital, was admitted to bed No. 10 of St. Agnes's Ward. She had left that hospital perfectly re-established in health; and came to the Hôtel-Dieu with her infant, whom she did not wish to nurse, being in this respect like too many other women. The poor infant was dying from hunger, and in a deplorable, utterly hopeless state. You have seen confluent thrush covering the mucous membrane of the mouth. I avail myself of the opportunity afforded by this case of speaking to you of this disease, which, in pathological treatises, is confounded with plastic affections, though it has but a remote analogy to them.

Thrush [*muguet, blanchet*] is an affection characterised by the presence of small granular masses, which, at first are transparent, but soon acquire a dull white colour: they are developed on the surface of mucous membranes, particularly on that of the mouth: they generally first show themselves on the tip and edges of the tongue, and at other times on the labial commissure and inside of the lips, as well as on the inside of the cheeks. The millet seed rash [*le millet*]—for so the affection is still designated—also appears on the veil of the palate, tonsils, and pharynx. The individual miliary concretions, by increasing in number, form irregular patches varying in extent and thickness, of a creamy white colour and caseous consistence, suggesting the idea of a layer of coagulated milk. Sometimes, they have a yellowish, and at other times a grey tint, in which latter case there is a possibility of their being mistaken for diphtheritic deposits.

Whatever may be the seat and extent of the affection, it is only developed on mucous membranes, which, when in a normal state, are paved with epithelium. It is never found in the nasal fossæ; and when it invades the pharynx, it stops short at the posterior orifice of these cavities. When it covers the epiglottis, and the aryteno-epiglottidean folds, it never penetrates into the larynx. If it reach the œsophagus, it never proceeds to the intestine; for, as you know, the epithelial pavement of the upper portion of the digestive canal stops at the cardiac orifice of the œsophagus.

Thrush was formerly called *aphthes confluents, aphthæ confluentes, aphthæ lactantium,* and *aphthæ infantiles.* No names could be more objectionable, for the affection has not the least resemblance to aphthæ. In thrush, we meet with no vesicles, papules, nor ulcerations, not at least in the first state of the affection; and the difference between thrush and aphthæ is as wide as that between scarlatina and small-pox. The terms *muguet* and *blanchet* are much to be preferred to *aphthes,* for they do not imply any opinion as to the nature of the affection: they refer to the aspect of the lesion which they characterise, an aspect which has been justly compared to a little white flower of powerful perfume, the lily of the valley [*muguet*] *convallaria maialis,* which, in May, blossoms in our woods, and which all of you know.

Thrush, then, is chiefly an affection of the buccal mucous membrane. It is sometimes a purely local affection, but at other times, it is the sign of a particular condition of the general system.

When infants are obliged to make violent efforts in sucking, from the nipple being too small or not well formed, when they have to suck those linen, leather, or caoutchouc contrivances used by women whose nipples are chapped or too short, or when, being artificially nourished, they have sucked the hard orifices of feeding-bottles, their mouths very soon become the seat of an inflammation which leads to a fibrinous exudation, upon which the sporules of thrush are developed.

Till the microscope came to our assistance in the study of pathological lesions, it was believed that the whitish concretions of thrush were entirely composed of fibrine deposited in very fine layers upon an inflamed mucous membrane, and that the affection was of the plastic character. The microscope, however, has demonstrated that the characteristic element of thrush is a cryptogamic plant similar to the *sporotricium*, according to M. Gruby, or a mycelium, the *oidium albicans*, according to M. Charles Robin,[1] consequently a mould similar to that which forms on milk, as well as on organic animal and vegetable substances. This is a point regarding which, at the present day, no doubt can exist. It is equally a matter of certainty that for the development of this mycelium, special conditions are requisite: there must be a pre-existing inflammation of the mucous membrane on which it is seated, and that inflammation must have a somewhat specific character.

When there is inflammation of the mucous membrane of the vagina, the mucous secretion resulting therefrom contains animalcules of a particular kind, which are more or less numerous according to the greater or less severity of the inflammation. It does not follow that the inflammation is the result of the presence of the animalcules: it only shows that the muco-purulent secretion in undergoing alteration becomes possessed of qualities in virtue of which animalcules are developed. Something takes place analogous to that which occurs in milk. When milk is pure, it is impossible to discover in it any extraneous animal or vegetable product; but if it be allowed to get sour, its constitution becomes modified, and then there is developed in it an infinite number of microscopic animalcules which have their place in the nosological scale.

The first condition then required for the development of thrush is the presence of a special secretion, and that secretion is necessarily

[1] Robin (Charles):—Histoire Naturelle des Végétaux Parasites. Paris, 1853.

a product of inflammation. Even micrographers do not dispute this fact; for they admit that a fibrinous substance constitutes the greater portion of the granular bodies of thrush, and that the mycelium is a secondary element.

Such being the state of the case, it is of very little importance, looking at the question from a clinical point of view, whether thrush be a vegetable parasite originating under certain special conditions, and in accordance with the laws of the so-called spontaneous generation of an inferior order of organised beings; or whether it is an animal substance composed of fibrine and muco-pus. Is it not, whether we adopt the one theory or the other, a pathological product, originating in a morbid condition of the persons in whom it is found? Does the settlement of this question affect the aspect of the affection, the nature of the malady, or its symptomatic manifestations? Assuredly not. Neither does it affect the treatment; for it matters very little to the physician whether he has to do with a mushroom or a false membrane, as experience has put him in possession of sure means of curing the patient: and his highly scientific views upon the mooted point have proved useless to him. Far be it from me, however, Gentlemen, to disparage the service which micrographers have rendered to nosology; but on the other hand, it would be wrong to exaggerate the bearing and practical utility of their discoveries.

Under what conditions does thrush supervene? In the first place, let us see in what circumstances it occurs *in adults?* It supervenes in all chronic maladies, in pulmonary phthisis, pleurisy, chronic peritonitis, and affections which are generally under the influence of the tubercular diathesis: it supervenes in chronic diarrhœa, which is often related to this same diathesis: it supervenes in those cancerous diseases of the stomach and intestines which give rise to exhausting intestinal fluxes: it likewise supervenes in persons wasting from profuse and long continued suppuration. Thrush also develops itself at the close of hectic maladies: it is then a prognostic of the very worst character. When chronic maladies have arrived at their last stage, nausea, vomiting, and diarrhœa testify to the existing disturbance of the digestive function: the mucous membrane of the stomach and intestines has then been attacked, and is the seat of morbid modifications: the mucous membrane of the mouth, participating in these anatomical and functional disturbances, becomes subject to an alteration in its secretions, and thus a condition is

produced favourable to the development of thrush. The local affection, then, is entirely dependent upon a serious lesion of the digestive apparatus, a lesion too which is itself the sign of a still more serious lesion of the general system. Finally, I repeat the proposition, that, however we may explain it, it is a fact that when thrush supervenes at the close of chronic diseases, it is generally a prognostic that dissolution is near.

In children, thrush is observed under similar circumstances. In them also, it is in diseases of long duration that it appears: here, however, duration is a term relative to the age of the subjects, for, a disease which lasts eight or ten days is a long disease in one whose age is only fifteen days. It is in infants of a few days old, or in children in the first months of their existence, who have been affected for some time with affections of the digestive function or with a disease of the skin or respiratory apparatus, that we find thrush becoming developed. In them, as in the adult, it is the local expression of a very bad state of the whole system. Usually, this bad general condition is the result of improper alimentation, or, to speak more correctly, of inanition, which is the final consequence of mal-nutrition.

The defect in diet may possibly be in itself absolute, as I have too often seen: or the infants may be fed with aliment quite unsuited to their digestive organs; as for example, when in place of getting the milk of women, or at least of cows, they are gorged at a very early age with boiled meat, meat broths, and vegetables passed through the cullender, a practice which we see perpetrated by nurses, and even by mothers devoid of intelligence or under the dominion of stupid prejudices. When thus undergoing premature weaning, the poor infants are attacked with gastric and intestinal affections, regarding which, on a future occasion, I shall have to speak to you, and under the influence of which thrush is developed.

But the defect in alimentation—in this particular case we must say the mal-assimilation—may depend upon an original and direct lesion, or on a sympathetic disorder arising during the course or at the beginning of some other disease such as erysipelas or pneumonia; or also in the course of scleremia, that disease peculiar to new-born infants, which is characterised by great debility, and in particular by induration of the skin and cellular tissue of the extremities, extending sometimes to the trunk, and in which œdema and swelling, one or both, may be either present or absent.

Thrush, therefore, being the local manifestation of a serious general affection of the system, it ceases to be matter of surprise that so excellent an observer as the late Dr. Valleix asserted that it was so formidable that twenty of every twenty-two patients who had it died from it.[1] Valleix collected at the Children's Hospital the dismal statistics on which he based this opinion: the subjects observed by him were children abandoned by their mothers, and almost in every case dying from hunger, suffering for the most part from inflammatory affections, generally from affections of the stomach and intestines. Now, in such cases, thrush is the herald of the near approach of death; but it is the disease during the course of which thrush has supervened, and not the supervening thrush which carries off the patient.

Gentlemen, the first form of thrush to which I have referred has no prognostic significance: it is simply *a local affection*. It has no import in the least degree serious, and remains confined to the parts in which it originally appeared: this is the only form of the affection which those physicians have had in view, who have maintained, in opposition to Valleix, that thrush is one of the mildest of maladies. As I stated at the beginning of this lecture, when an infant encounters difficulty in sucking, whether that difficulty arise from the nipple of the breast being badly formed, or whether it proceed from sucking a hard teat attached to a feeding bottle, or an artificial nipple, it is—under an epidemic influence of which we know nothing—seized with inflammation of the mucous membrane of the mouth, in other respects the general health remaining good: this stomatitis forthwith gives rise to thrush, which will generally be very transient, and not troublesome. But should this form of thrush become confluent, if the patches which form are very thick in their substance, and very large, they cause considerable embarrassment in sucking, an embarrassment of which the infant gives evidence by making a ceaseless chewing movement with the jaw, and almost incessantly protruding the tongue. This embarrassment will be increased by the pain which the infant suffers from the acute inflammation of the tongue and mouth. From the important part which the tongue plays in the action of sucking, you can understand why an infant with an inflamed tongue will refuse to suck: you can

[1] Valleix:—Clinique des Maladies des Enfants Nouveau-nés, chap. iii. Paris, 1838. See also the same author's "Guide du Médecin."

also understand that although idiopathic thrush is in itself a mild affection, it may become, under certain circumstances, the starting point of a formidable disease: by rendering alimentation difficult or perhaps impossible, it may be the indirect cause of the patient's death. Such cases, however, are altogether exceptional. I must, therefore, still maintain the proposition that idiopathic thrush is, strictly speaking, not a disease, but simply a slight and transient local affection. One who understands the right treatment can generally master the affection in twenty-four, thirty-six, or forty-eight hours, or at least in three or four days. Infants very quickly begin to take the breast as before, and return to perfect health, when the transient disorder of the mouth has passed away.

There is another kind of thrush which requires to be distinguished from those which I have already described; and to which, if I may, I propose to give the name of mixed thrush [*muguet mixte*]. The affection of the mouth in which it originates, and which, in the first instance, was alone present, is simply the earliest manifestation of a general condition under the influence of which it is produced. Symptoms of a more or less serious character connected with the stomach and bowels supervene, showing that mischief exists of so formidable a character, as to lead to a general derangement of the whole system in very young children. Indeed, it is not uncommon to see new-born infants, who at first seemed only to have stomatitis along with thrush, very soon afterwards seized with vomiting and diarrhœa, accompanied by erythema of the buttocks, which I pointed out to you in our little patient who lies in bed No. 16. The state of phlegmasia, or if you prefer the term, the pathological state, (for perhaps I am wrong in making use of the term phlegmasia, since inflammation really exists), that pathological condition occupies the entire continuity of the digestive canal from the mouth to the extreme end of the passage. In the mouth, you see the mucous membrane stripped of its epithelium, of a more or less vivid red colour, and the surface of the denuded dermis covered with characteristic concretions, distinct on the upper surface of the tongue, and confluent (forming caseous patches) upon its under surface and on the inside of the cheeks. On the buttocks, likewise, the skin is of a bright red, and in some places stripped of its epidermis. On the skin and on the mucous membrane, the lesion is the same in kind; but as there is no secretion from the skin, to cause the development of mycelium, you will there only find a trace of phlegmasia; whereas

from the mucous secretion offering conditions favourable to the generation of oidium, the mucous membrane of the mouth simultaneously presents the lesions which indicate inflammation, and the production of the peculiar deposit on which the thrush is developed.

The child on whose case I am now lecturing is affected with that kind of thrush. It is in him, in point of fact, the first manifestation of a very serious general condition of the system, under the influence of which the inflammation of the mouth has originated. This child does not suck, and although he has still all the appearance of good health, his life is in great jeopardy. From want of proper alimentation, the blood, no longer receiving its reparative materials, becomes impoverished, and its secretions are necessarily altered in character. The organs whose function it is to eliminate from the blood the elements of these secretions must in consequence undergo a special pathological modification possessing all the characters of inflammation. The mucous membrane of the mouth was first attacked, and that of the stomach and intestines will be affected next in turn: although as yet the case seems to be nothing more than thrush, that is to say, nothing more than an unimportant local affection if looked at by itself, the child is nevertheless inevitably doomed to die within a very brief interval, unless, with all possible speed, measures be taken to supply it with the nutriment of which it is in need.

Here, then, Gentlemen, are the three kinds of thrush which ought, in my opinion, to be recognised. First: there is thrush occurring in infants as a purely local affection, depending upon irritation of the mouth, more or less acute in character, and longer or shorter in its duration. It is not accompanied by any symptoms affecting the general system, nor is it more than an insignificant malady, although, in a few very exceptional cases, it may be the cause of serious mechanical obstacles to due alimentation. Second: there is that kind of thrush which supervenes both in adult and child, as the sequel of a severe attack of disease, appearing as the final manifestation of some serious disorder to which the system has been subjected. Third: there is thrush showing itself as the first manifestation of a severe constitutional disorder, the other symptoms of which are not long in following. You can perfectly appreciate the differences which exist between the second species of thrush, and that which I call the mixed [*mixte*] form of the affection.

Valleix attached great importance to *erythema of the buttocks*, which he regarded as present in almost every case, and as one of the earliest observed symptoms of thrush in children. This erythema is more or less extended: sometimes, it invades the thighs, the posterior and inner aspects of the legs, the scrotum, and the labia majora: the redness varies between a bright red and a brownish red. The skin is often excoriated, and in some rare cases, it becomes scarred with pretty deep ulcerations. The erythematous redness and the ulcerations show themselves likewise on the heels and malleoli. It would, however, be a mistake to consider them as symptoms of thrush. Cutaneous inflammations originate in the same causes as the inflammation of the mouth which gives rise to thrush. The two affections are similar in respect of their cause; but neither of them in any way dominates over the other.

In the majority of cases, the erythema is the result of the irritation produced in the affected parts by the contact of urine and fæcal matter, and the friction of these parts with the swaddling clothes of the infant: this explains why the erythematous inflammation is met with particularly in the shins and heels, and why it is more decided, and why it more commonly proceeds to inflammation in these parts. They are the parts subjected to the most energetic and constant friction, from the child ceaselessly moving the legs and rubbing his heels against one another, and against the swaddling bands in which the malleoli are wrapped. You will see redness of the buttocks and inferior extremities in the healthiest infants, particularly in those, of whom we receive too many in the hospitals, more or less neglected in respect of cleanliness, and swaddled in coarse linen. Erythematous redness showing itself independently of thrush may be regarded as a first degree of the erythema which accompanies that affection: it enables us to understand the mechanical causes of the erythema of thrush, though there is this difference, as I have already remarked, that in the erythema of thrush there exists a general cause, as well as one which is local and mechanical.

Here the same thing takes place as occurs in persons suffering from putrid fever or any other septic disease. Seeing that an individual who has sustained an injury, a fracture of the thigh-bone for example, but who in other respects is in good health, cannot remain on his back for forty-five days without having some redness of the buttocks, it is obvious that much less time will be necessary for a patient with typhoid fever, not only to have erythematous redness

but even excoriations and gangrenous ulcerations of greater or less depth over the sacrum, the ischiatic tuberosities, the heels, or any of the bony projections subject to pressure or friction. This arises from the fact that independent of pressure or friction, independent of irritation produced by the contact of urine or fæces, there exists deficient vitality of the skin, and a remarkable tendency to sphacelus, which is one of the characters of that condition conventionally called putridity in severe fevers, and is one of the consequences of inanition.

There is, I repeat, a similar state of matters in the erythema and ulcerations of children affected with thrush. There exist both in the erythema and ulcerations, and in the thrush, manifestations of the bad general state of the individual's system: but the two have not that mutual relation to each other which Valleix wished to establish.[1]

Without dilating more on these questions, I now come to the subject of *treatment*.

When thrush is a purely local affection, it is easily cured: all that is required is the use of borax-honey. This preparation, according to the formula which I employ, is composed of equal weights of borax and honey—of each 10 grammes [155 grains]. The whole of the interior of the infant's mouth ought to be smeared with this mixture seven or eight times: and if this be done, it will generally be found, at the end of twenty-four or forty-eight hours, that the malady is gone. Possibly, some of the salve may be swallowed by the patient; but from that no great inconvenience can arise, as borax is no more injurious to the economy than bicarbonate of soda: there may even be an advantage in the occurrence, should the thrush have reached the lower portions of the pharynx and œsophagus, by the salve there producing a beneficial effect. The topical application which I have now described is in such general use in my wards, that the nurses frequently do not wait for the arrival of the physician to commence the treatment of children brought in with thrush. Consequently, it often happens that in the morning I see little patients who had been admitted with thrush on the preceding afternoon, who were quite cured of it in a few hours.

It is necessary, however, Gentlemen, to continue the treatment even after the disappearance of the thrush, because there still

[1] Valleix:—Clinique des Maladies des Enfants Nouveau-nés. Paris, 1838.

remains a necessity to cure the inflammation of the mucous membrane of the mouth, under the influence of which the affection was developed: unless that inflammation is modified, the thrush which went away so quickly will be certain to reappear.

Chlorate of potash may be substituted for borax, the quantity and the method of employing it being the same. I must say, however, that it has never seemed to me to act so rapidly as borax.

Should thrush resist the action of these modifying agents, there remains another to be employed which it never resists: that is nitrate of silver. A weak solution, a solution in the proportion of one gramme of the salt [15½ grains] to ten grammes of distilled water, I consider preferable to the solid caustic, because it is easier to touch all the little folds of the buccal mucous membrane with a hair pencil than with a stick of lunar caustic. Perhaps the solution of the nitrate of silver is to this extent objectionable, that if the child swallowed some of it, nausea or even vomiting might be the consequence: but these inconveniences, which after all are not very serious, may be averted, by injecting water into the mouth after the use of the solution. In the adult, the blackening of the teeth is an additional drawback to the nitrate of silver. When, therefore, in adults, thrush does not yield to salves or washes of borax or chlorate of potash, recourse must be had to cauterizations with solutions of sulphate of zinc or sulphate of copper in the proportion of ten parts (by weight) of the salt to one of water, the patients being recommended to rinse the mouth and spit immediately after the operation.

The local affection is cured! If it had alone existed, nothing more would remain to be done: and the infant would resume taking the breast. But when the local affection is under the dominion of a peculiar state of the system, it will not be long in reappearing, whatever you may do; or at least you will require constantly to repeat the application of the means by which you seek to destroy it. I need hardly say that this end is unattainable in persons who have phthisis or cancer, or who have arrived at the last stage of an attack of a bad fever, or are the subjects of hectic fever.

In infants, when thrush is connected with a bad state of system dependent on mal-nutrition, no time must be lost in providing them with good wet-nurses. In families, mothers very often wish to have the pleasure of suckling their children, even when from delicate

health they do not possess the essential conditions of a good nurse. Their infants, from sucking empty breasts or only getting very poor milk, soon begin to pine and to become affected with thrush. However much displeasure you may give to a mother to whom to continue the suckling of her infant would be a great delight, do not hesitate to use your authority. It is one of those occasions upon which the physician must speak with imperious authority, so as to bear down all the opposition which his opinions may meet with from the family. Set forth the danger which is being incurred by the patient confided to you, and insist with all your power on the absolute necessity of action being taken in accordance with your demands.

Reparative aliment—and woman's milk is the best and most suitable food for infants—may of itself prove sufficient by restoring the infant to health, to prevent the reappearance of the thrush which the topical remedies have cured for the time being. If there exist erythema of the buttocks, or ulceration of the shins and heels, you are then in a position to contend against them advantageously. This may be done by powdering the affected parts with white bismuth. If that fail, employ a mixture of powdered starch and white precipitate. If still the cure progresses slowly, prescribe lotions of *eau phagédénique*,[1] and touch the ulcerated points with a weak solution of sulphate of copper.

When thrush is connected with disordered digestion in an infant whose feeding is suitable, the treatment must be directed to that disordered digestion and the associated gastro-intestinal phlegmasia. On a future occasion, Gentlemen, I shall return to this important question; but to-day I may mention that in the treatment of such cases much benefit is obtained from the use of alcaline preparations. Prepared chalk rubbed up with syrup, and given to the infant before sucking five or six times a day, in doses of from 25 to 30 centigrammes [from $3\frac{1}{7}$ to $4\frac{2}{7}$ grains]; and lime water in doses of from 40 to 60 grammes [about from $1\frac{1}{2}$ to 2 fluid oz.] have often, in my practice, rendered real service. White bismuth is also indicated in doses of from 2 to 4 grammes [31 to 62 grains] when the powder is

[1] The *eau phagédénique* is a solution of hydrochlorate of lime, holding suspended binoxide of mercury, which gives it its yellow colour. It is prepared by pouring an aqueous solution of eight grains of corrosive sublimate into four ounces of lime water.—Translator.

thoroughly mixed up with sugar, children take it easily. It is of paramount importance to regulate the diet, so that the infant may have the breast with as much regularity as possible every two hours.

The statistical results published by Valleix are appalling: but you must bear in mind that you will be more fortunate in your private than we are in our hospital practice; for you will rarely meet with patients so unfavourably placed as the wretched children who from the very nature of things come to die in our establishments. Exhausted by the misery and protracted starvation to which they have been subjected by the persons who abandon them, they sink, notwithstanding all the attentions by which they are surrounded. In such cases, the non-success of treatment must not be imputed to the want of skill in the physicians, but to the deplorable hygienical conditions to which the patients have been subjected.

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